QCPU-A (A Mode)

User's Manual

MITSUBISHI

Mitsubishi
Programmable Controller

MELSEC-Q

Q02CPU-A
Q02HCPU-A
Q06HCPU-A

● SAFETY PRECAUTIONS ●

(Read these precautions before using this product.)

Before using the product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

⚠ WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under " ⚠ CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[DESIGN PRECAUTIONS]

⚠WARNING

● Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.

(1) Configure external safety circuits, such as an emergency stop circuit, protection circuit, and protective interlock circuit for forward/reverse operation or upper/lower limit positioning.
(2) When the programmable controller detects the following error conditions, it stops the operation and turn off all the outputs.
- Overcurrent or overvoltage protection of the power supply module is activated.
- The CPU module detects an error such as a watchdog timer error by the self-diagnostic function.

All outputs may turn on when an error occurs in the part, such as I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to Chapter 9 LOADING AND INSTALLATION in this manual.

(3) Outputs may remain on or off due to a failure of an output module relay or transistor. Configure an external circuit for monitoring output signals that could cause a serious accident.

● In an output module, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.

[DESIGN PRECAUTIONS]

⚠ WARNING

- Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.

- For the operating status of each station after a communication failure, refer to relevant manuals for the network.
  Incorrect output or malfunction due to a communication failure may result in an accident.

- When controlling a running programmable controller from a peripheral connected to the CPU module or from a personal computer connected to a special function module, configure an interlock circuit in the sequence program to ensure that the entire system will always operate safely.
  For program modification and operating status change, read relevant manuals carefully and ensure the safety before operation.
  Especially, in the case of a control from an external device to a remote programmable controller, immediate action cannot be taken for a problem on the programmable controller due to a communication failure.
  To prevent this, configure an interlock circuit in the sequence program , and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.

- When setting up the system, do not allow any empty slot on the base unit.
  If any slot is left empty, be sure to use a blank cover (A1SG60) or a dummy module (A1SG62) for it.
  Otherwise, internal parts of the module may be flied in the short circuit test or when an overcurrent or overvoltage is accidentally applied to the external I/O section.

⚠ CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables.
  Keep a distance of 100mm (3.94inches) or more between them.
  Failure to do so may result in malfunction due to noise.

- When a device such as a lamp, heater, or solenoid valve is controlled through an output module, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on.
  Take measures such as replacing the module with one having a sufficient current rating.

- Time from when the CPU module is powered on or is reset to when it enters in RUN status depends on the system configuration, parameter settings, and program size.
  Design the program so that the entire system will always operate safely, regardless of the time.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the programmable controller under the environment that meets the general specifications in this manual.
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.

- To mount the CPU module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect mounting may cause malfunction, failure or a drop of the module.
  When using the programmable controller in an environment of frequent vibrations, fix the module with the screw.
  Tighten the screw within the specified torque range.
  Undertightening can cause drop of the screw, short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

- Insert securely the module fixing projection at the bottom of the AnS series module into the fixing hole in the base unit and then tighten the module fixing screw within the specified torque.
  When no screw is tightened, even if the module is installed correctly, it may cause malfunctions, a failure or a drop of the module.
  Tightening the screw excessively may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.

- When using an extension cable, connect it to the extension cable connector of the base unit securely.
  Check the connection for looseness.
  Poor contact may cause incorrect input or output.

- When using a memory card, fully insert it into the memory card slot.
  Check for incomplete connection after installing it.
  Poor electrical contact may cause malfunctions.

- Shut off the external power supply for the system in all phases before mounting or removing the module.
  Failure to do so may result in damage to the product.

- Do not directly touch any conductive part of the module.
  Doing so can cause malfunction or a failure of the module.

[WIRING PRECAUTIONS]

⚠ WARNING
● Shut off the external power supply for the system in all phases before wiring. Failure to do so may result in electric shock or damage to the product. ● After wiring, attach the included terminal cover to the module before turning it on for operation. Failure to do so may result in electric shock.

[WIRING PRECAUTIONS]

⚠ CAUTION

- Ground the FG and LG terminals to the protective ground conductor dedicated to the programmable controller.
  Failure to do so may result in electric shock or malfunction.

- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.

- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly.
  Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.

- Do not connect multiple power supply modules to one module in parallel.
  The power supply modules may be heated, resulting in a fire or failure.

- Connectors for external connection must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered.
  Incomplete connections could result in short circuit, fire or malfunction.

- Tighten the terminal screw within the specified torque range.
  Undertightening can cause short circuit, fire, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure or malfunction.

- A protective film is attached to the top of the CPU module to prevent foreign matter, such as wire chips, from entering during wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.

- Mitsubishi programmable controllers must be installed in control panels.
  Connect the main power supply to the power supply module in the control panel through a relay terminal block.
  Wiring and replacement of a power supply module must be performed by maintenance personnel who is familiar with protection against electric shock. (For the wiring methods, refer to Section 9.5.)

[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠ WARNING

- Do not touch any terminal while power is on.
  Doing so will cause electric shock.

- Correctly connect the battery connector.
  Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire.
  Doing so will cause the battery to produce heat, explode, or ignite, resulting in injury and fire.

- Shut off the external power supply for the system in all phases before cleaning the module or retightening the terminal screws or module fixing screws.
  Failure to do so may result in electric shock.
  Undertightening the terminal screws can cause short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

⚠ CAUTION

- Before performing online operations (especially, program modification, forced output and operation status change) for the running CPU module from the peripheral connected, read relevant manuals carefully and ensure the safety.
  Improper operation may damage machines or cause accidents.

- Do not disassemble or modify the modules.
  Doing so may cause failure, malfunction, injury, or a fire.

- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm (9.84inches) away in all directions from the programmable controller.
  Failure to do so may cause malfunction.

- Shut off the external power supply for the system in all phases before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.

- After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module more than 50 times (IEC 61131-2 compliant) respectively.
  Exceeding the limit of 50 times may cause malfunction.

- Do not drop or apply any shock to the battery to be installed in the module.
  Doing so may damage the battery, causing the battery fluid to leak inside the battery. If the battery is dropped or any shock is applied to it, dispose of it without using.

- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body.
  Failure to do so may cause the module to fail or malfunction.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION
● When disposing of the product, treat it as an industrial waste. When disposing of batteries, separate them from other wastes according to the local regulations. (For details of the Battery Directive in EU member states, refer to Appendix 7.)

[TRANSPORTATION PRECAUTIONS]

⚠ CAUTION
● When transporting lithium batteries, follow the transportation regulations. (For details of the regulated models, refer to Appendix 6.)

● CONDITIONS OF USE FOR THE PRODUCT ●

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
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("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

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Introduction

Thank you for purchasing the Mitsubishi programmable controller MELSEC-Q series.
Before using your new programmable controller, please read this manual thoroughly to gain an understanding of its functions so you can use it properly.
Please forward a copy of this manual to the end user.

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About This Manual

The following manuals are related to this product.

Related manuals

Manual Name	Manual No. (Model Code)
ACPU/QCPU-A (A mode) Programming Manual (Fundamentals) Describes programming methods necessary for creating programs, device names, parameters, program types, memory area configuration, and so on. (Sold separately)	IB-66249 (13J740)
ACPU/QCPU-A (A mode) Programming Manual (Common Instructions) Describes how to use the sequence instruction, basic instructions, applied instructions and microcomputer programs. (Sold separately)	IB-66250 (13J741)
AnSHCPU/AnACPU/AnUCPU/QCPU-A (A mode) Programming Manual (Dedicated Instructions) Describes instructions that have been expanded. (Sold separately)	IB-66251 (13J742)
AnACPU/AnUCPU/QCPU-A (A mode) Programming Manual (PID Instructions) Describes dedicated instructions to perform the PID control. (Sold separately)	IB-66258 (13J744)
AnS Module type I/O User's Manual Describes the specification of the compact building block type I/O module. (Sold separately)	IB-66541 (13JE81)

USER PRECAUTONS

Precautions when using the CPU module

For a new CPU module, which has never used before, the contents of CPU module (built-in RAM and device data) and memory card are undefined.
Make sure to clear the built-in RAM memory (PC memory all clear) in the CPU module by peripheral devices and operate latch clear by RESET/L.CLR switches.

Precautions for battery

(1) The operation after a battery is unmounted and the programmable controller is stored
When reoperating after a battery is uncounted and the programmable controller is stored, the contents of CPU module (built-in RAM and device data) and memory card may be undefined.
For this reason, make sure to clear the built-in RAM memory (PC memory all clear) in the CPU module by peripheral devices, operate latch clear by RESET/L.CLR switches, and format the memory card before starting the operation again.*
After the built-in RAM clear, latch clear and memory card format of the CPU module, write the backed-up memory contents to the CPU module and the memory card before saving.

(2) The operation after excess of a battery life
If a battery exceeded its guaranteed life is stored and reoperated, the contents of CPU module (built-in RAM and device data) and memory card may be undefined.
For this reason, make sure to clear the built-in RAM memory (PC memory all clear) in the CPU module by peripheral devices, operate latch clear and memory card format by RESET/L.CLR switches before start the operation again.*
After the built-in RAM clear and latch clear of the CPU module, write the backed-up memory contents to the CPU module and the memory card before saving.

POINT
Make sure to back up each memory contents before storing the programmable controller.

* Refer to the following manuals for details of built-in RAM clear (PC memory all clear) memory card format by peripheral devices.
- GX Developer Operating Manual
- A6GPP/A6PHP Operating Manual
- SW□IVD-GPPA Operating Manual

Refer to Section 4.6.3 for latch clear operation by RESET/L.CLR switch of the CPU module.

1 OVERVIEW

This user's manual describes the performance, functions, and handling method of the QCPU-A, as well as the specifications and handling of the memory card, power supply module and the base module.

The programming modules and software packages have to be compatible with the upgraded A2UCPU, A2UCPU-S1, A3UCPU, and A4UCPU (abbreviated as AnUCPU hereafter).
When the conventional programming modules and software packages are used, the usable range varies depending on the model of the CPU (programmable controller model name). (Refer to Section Section 2.2.3.)

Related to each module used in the CPU modules, check "System equipment list" in Section 2.3.
Refer to Section Section 2.2.1 for the special function modules which have limited usable devices range.

(1) Bundled parts

Product Name	Model	Quantity
CPU module	Q02CPU-A	1
	Q02HCPU-A	
	Q06HCPU-A	
Battery	Q6BAT	1

1.1 Features

QCPU-A (A mode) has the following features compared with A2USHCPU-S1.

(1) High-speed operation processing speed
QCPU-A offers significantly higher operation processing than that of A2USHCPU-S1.

Item	Q02CPU-A	Q02HCPU-A, Q06HCPU-A	A2USHCPU-S1
Operation processing speed*1	79ns	34ns	90ns

*1 I/O processing: At refresh or LD instruction

(2) Greater program capacity
By using Q06HCPU-A, the program capacity can be expanded.
Moreover, Q06HCPU-A can create subprograms.

Item	Q06HCPU-A	A2USHCPU-S1
Program capacity	30k steps (Main program) + 30k steps (Subprogram)	30k steps

(3) Increased actual I/O points
QCPU-A offers 4096 actual I/O points, 4 times as increased as that of A2USHCPU-S1.

Item	Q02CPU-A, Q02HCPU-A, Q06HCPU-A	A2USHCPU-S1
Actual I/O points	4096 points	1024 points

(4) Increased extension stages
Up to 7 stages of extension base module can be added.

(5) Higher communication speed with peripheral devices
The communication speed with peripheral devices is considerably improved compared with A2USHCPU-S1.

Item	Q02CPU-A, Q02HCPU-A, Q06HCPU-A	A2USHCPU-S1
Communication speed (kbps)	115.2 *1	9.6

* 1 Designate 9.6kbps when using GPP of SW3D5C-GPPW or earlier.

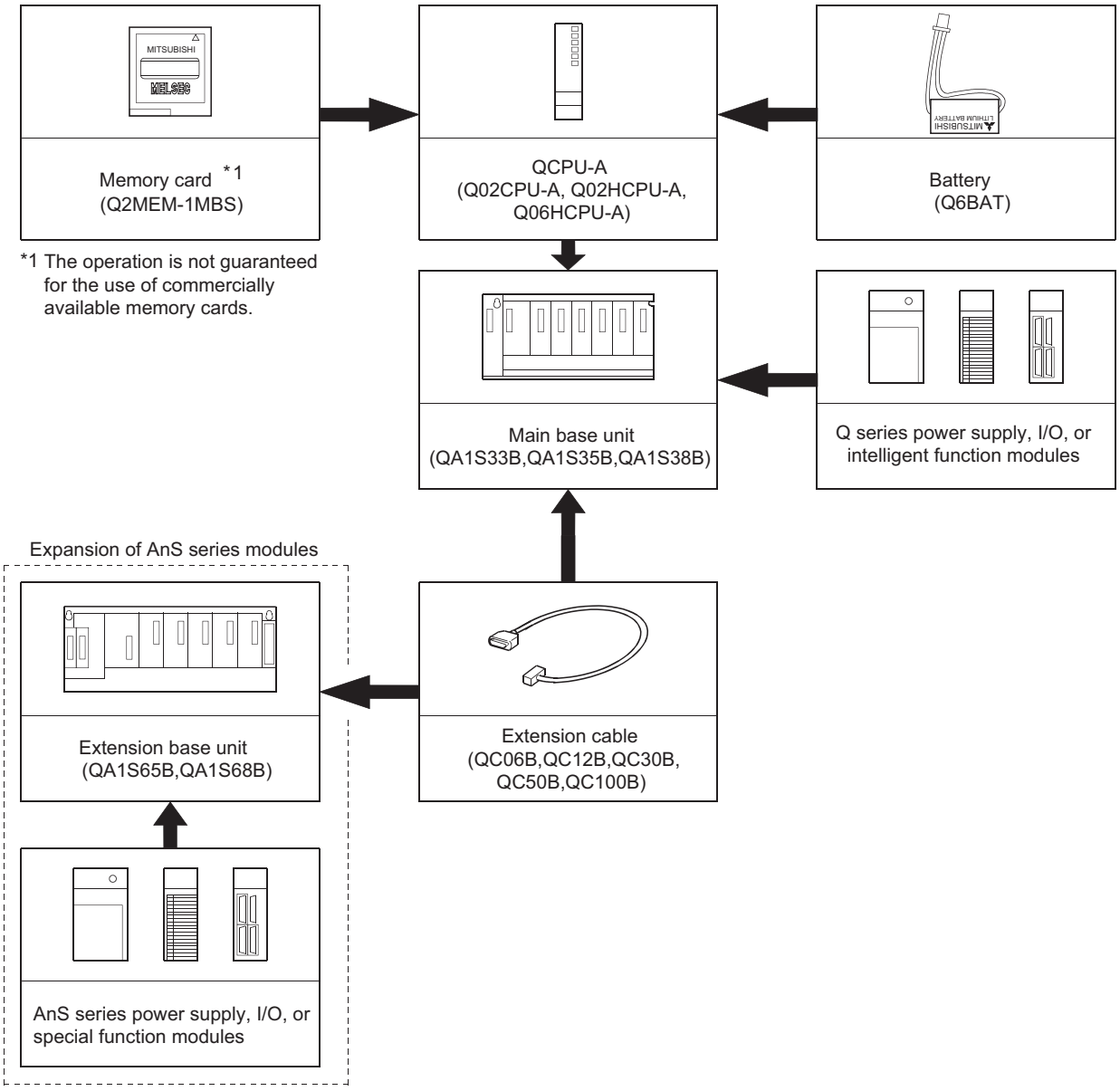
2 SYSTEM CONFIGURATION

This chapter shows the system configuration of QCPU-A, the relevant precautions and system equipment.

2.1 System Configuration

This section describes the configuration of the QCPU-A system, the configuration of peripheral devices, and the overview of the system configuration.

(1) Configuration of the QCPU-A system



2.2 Precautions When Configuring the System

The following shows the precautions when configuring the QCPU-A system:

2.2.1 Hardware

(1) Up to 64 I/O modules or special function modules can be mounted to each of the basic base unit or the expansion base unit.

(2) Up to 7 extension base units can be connected in the system.
(Up to 8 modules including the main base unit.)

(3) The total length of the extension cable should be 13.2m (43.31ft.) or less.

(4) The following shows the modules that have some limitations for the number of modules to be mounted.

<table>
<tr><th>Module</th><th colspan="2">No. of Mountable Modules</th></tr>
<tr><td>MELSECNET/10 network module
A1SJ71LP21(GE), A1SJ71LR21,
A1SJ71BR11</td><td>Up to 4 modules</td><td rowspan="2">Up to 4 modules in total</td></tr>
<tr><td>MELSECNET(II)/B data link module
A1SJ71AP21, A1SJ71AR21,
A1SJ71AT21B</td><td>Up to 2 modules</td></tr>
<tr><td>Interruption module: A1SI61</td><td colspan="2">1 module</td></tr>
<tr><td>AnS series special function module*1</td><td colspan="2">Up to 6 modules in total</td></tr>
<tr><td>GOT-A900 Series (Only when the bus connection is used.)*2
GOT1000 Series (Only when the bus connection is used.)*2</td><td colspan="2">Connection disable</td></tr>
</table>

*1 Applies to the following modules. Any modules but the following modules do not have the number of limitations to be mounted.
Ethernet interface module: A1SJ71E71N-B2 (-B5/-T)
Calculating machine link module: A1SJ71UC24-R2 (-R4/-PRF)
CC-Link module (in intelligent mode): A1SJ61BT11
Intelligent communication module: A1SD35ID1(2)
ID interface module: A1SD35ID1(2)

*2 Refer to the following manual for the GOT models.
- GOT-A900 Series User's Manual (GT Works Versions2/GT Designer2 Version2 Compatible Connection System Manual)
- GOT1000 Series Connection Manual (Mitsubishi Products)

(5) The accessible device ranges have limit when the following modules are used:

Applicable Module	Accessible Device Range in CPU	
	Device	Accessible Range
MELSECNET(II) data link module: A1SJ71AP21, A1SJ71AR21 MELSECNET/B data link module: A1SJ71AT21B	Input (X), output (Y)	X/Y0 to X/Y7FF
	Internal relay (M)	M0 to M8191
	latch relay (L)	L0 to L8191
	Link relay (B)	B0 to BFFF
	Timer (T)	T0 to T2047
	Counter (C)	C0 to C1023
	Data register (D)	D0 to D6143
	Link register (W)	W0 to WFFF
	Annunciator (F)	F0 to F2047

(6) It is recommended that the network and data link modules are mounted to the basic base unit.
When these modules are mounted to the extension base unit, the link refresh time becomes longer than the case where they are mounted to the basic base unit.

2.2.2 Software package

(1) GPP function software packages and model name setting at the start-up

The following table shows the GPP function software package that can be used to create the QCPU-A program, and the programmable controller type setting at start-up.

When using SW4D5C-GPPW or later, select the programmable controller type from Q02(H)-A or Q06H-A according to the CPU to be used.

When using the peripheral devices and GPP function software package of SW3D5C-GPPW or earlier, specify the programmable controller type name as "A4U". If "A4U" is not found in PLC type names, specify "A3A." If both "A4U" and "A3A" are not found, specify "A3H."

Note that when "A4U" is specified, the available device range is limited.

Peripheral device	Software package for system start-up	Programmable controller CPU model setting	
		Q02(H)-A	Q06H-A
PC/AT personal computer	SW4D5C-GPPW or later	Q02(H)-A	Q06H-A
	SW3D5□-GPPW or earlier	A4U	A4U
	SW□IVD-GPPA		
A6PHP	SW3GP-GPPA	A3H	A3H
	SW4GP-GPPA	A3A	A3A
	SW1GP-GPPAU	A4U	A4U
A6GPP	SW3-GPPA SW3GP-GPPA	A3H	A3H
	SW4GP-GPPA	A3A	A3A
	SW1GP-GPPAU	A4U	A4U

POINT

(1) Old software packages other than listed above cannot be used.
(2) To construct MELSECNET/10 network system with QCPU-A, use the AnU-compatible GPP function software package (which includes "A4U" in its programmable controller type name).
A network cannot be constructed with the GPP function software package which is not compatible with AnU (which does not include "A4U" in its programmable controller type name).
(3) Communication with GX Developer at 115.2kbps may not be available depending on the peripheral devices. In such a case, select the lower communication speed.
(4) When using Q02(H)CPU-A and conventional peripheral devices and setting the programmable controller type as "A4U," designate the main program setting to 28k steps or less with parameters. When "Main + parameter" is written with the programmable controller with the setting of 29k steps or more, "Cannot communicate with PC" is displayed, and writing to the CPU module is disabled.
(5) Subprograms cannot be used with Q02(H)CPU-A. When using conventional peripheral devices and setting the programmable controller type as "A4U," do not specify any subprograms. If any subprograms are specified, "Cannot communicate with PC" is displayed.
With Q06HCPU, subprogram 1 can be used, but subprograms 2 and 3 cannot.
When subprogram 2 or 3 is specified, the same message above is displayed.

(2) Utility package

(a) None of the following utility packages for A6GPP/A6PHP can be used:

- SW□-AD57P
- SW□-UTLP-FN0
- SW□-UTLP-FN1
- SW□-UTLP-PID
- SW□-SIMA
- SW□-UTLP-FD1
- SW□-SAPA

* The packages marked with * can execute the same functions using the dedicated instructions.
For details, refer to type AnSHCPU/AnACPU/AnUCPU/QCPU-A (A Mode) Programming Manual (Dedicated Instructions).

POINT

(1) The utility package, which specifies the device and accesses the QCPU-A, can be used only in the device range for the A3ACPU, A3HCPU equivalent. (Refer to Section 2.2.3.)

(2) Use an AnU-compatible utility package to use the device range for the QCPU-A.
(Example: SW1IVD-SAP2, etc.)

2.2.3 Precautions when using GPP function software packages and A8PUE peripheral devices which are not compatible with AnU

When starting with GPP function software packages not compatible with the AnU, QCPU-A (starting with the programmable controller model name "A3A" or "A3H") or a A8PUE peripheral device (including A7PUS), the usable device ranges are limited as follows.

(1) List of usable device range

Item	AnACPU-compatible Module		A3HCPU-compatible Module	
	Programmable controller Model "A3A" at System FD Start-up	A8PUE	Programmable controller Model "A3H" at System FD Start-up	A7PUS
Instruction (sequence/basic/ application/dedicated)	All instructions can be used.			
Program capacity	Max. 14k steps can be used for the main program.			
I/O device points (X/Y)	X/Y0 to X/Y7FF can be used. (X/Y800 to X/Y1FFF cannot be used.)		X/Y0 to X/Y7FF can be used. (X/Y800 to X/Y1FFF cannot be used.)	
M, L, S relay	M/L/S0 to M/L/S8191 can be used.		M/L/S0 to M/L/S2047 can be used. (M/L/S2048 to M/L/S8191 cannot be used.)	
Link relay (B)	B0 to BFFF can be used. (B1000 to B1FFF cannot be used.)		B0 to B3FF can be used. (B400 to B1FFF cannot be used.)	
Timer (T)	T0 to T2047 can be used.		T0 to T255 can be used. (T256 to T2047 cannot be used.)	
Counter (C)	C0 to C1023 can be used.		C0 to C255 can be used. (C256 to C1023 cannot be used.)	
Data register (D)	D0 to D6143 can be used. (D6144 to D8191 cannot be used.)		D0 to D1023 can be used. (D1024 to D8191 cannot be used.)	
Link register (W)	W0 to WFFF can be used. (W1000 to W1FFF cannot be used.)		W0 to W3FF can be used. (W400 to W1FFF cannot be used.)	
Annunciator (F)	F0 to F2047 can be used.		F0 to F255 can be used. (F256 to F2047 cannot be used.)	
Index register (V, Z)	V, V1 to V6, Z, Z1 to Z6can be used.		V and Z can be used. (V1 to V6, Z1 to Z6 cannot be used.)	
Expanded comment	Max. 3968 points	–	Unusable	–
Latch (power failure compensation) range	The device range shown above can be latched.		The device range shown above can be latched.	
I/O assignment	Possible to register occupied I/O points and module model names.	–	Number of I/O occupied points can be registered.	–

(1) The device range other than listed above is the same as that of QCPU-A.

(2) Refer to Operating Manual for peripheral devices to be used for available functions.

2.3 System Equipment

The following shows various components of each module and peripheral device which can be used by the QCPU-A.

(1) Modules dedicated to AnS

Product Name	Model Name	Description	Number of Occupied Points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
CPU module	Q02CPU-A	Program capacity: 28k steps, I/O points: 4096, Processing speed for basic instruction: 79ns	–	0.60	–	
	Q02HCPU-A	Program capacity: 28k steps, I/O points: 4096, Processing speed for basic instruction: 34ns	–	0.64	–	
	Q06HCPU-A	Program capacity: 30k steps × 2 (Main/sub), I/O points: 4096, Processing speed for basic instruction: 34ns	–	0.64	–	
Memory card	Q2MEM-1MBS	SRAM type: 1MB	–	–	–	
Main base unit	QA1S33B	AnS series module mounting base (power supply module + CPU module + 3 slots for other module)	–	0.107	–	
	QA1S35B	AnS series module mounting base (power supply module + CPU module + 5 slots for other module)	–	0.117 (0.086)*	–	
	QA1S38B	AnS series module mounting base (power supply module + CPU module + 8 slots for other module)	–	0.118 (0.086)*	–	
Extension base unit	QA1S65B	AnS series module mounting base (power supply module + CPU module + 5 slots for other module)	–	0.117 (0.088)*	–	
	QA1S68B	AnS series module mounting base (power supply module + CPU module + 8 slots for other module)	–	0.118 (0.090)*	–	
Extension cable	QC06B	0.6m (1.97ft.) extension base cable	–	–	–	
	QC12B	1.2m (3.94ft.) extension base cable	–	–	–	
	QC30B	3.0m (9.84ft.) extension base cable	–	–	–	
	QC50B	5.0m (16.40ft.) extension base cable	–	–	–	
	QC100B	10.0m (32.81ft.) extension base cable	–	–	–	
Battery	Q6BAT	Battery for retaining the contents of built-in RAM and devices in case of power failure	–	–	–	
Cable	QC30R2	Communication cable for peripheral devices	–	–	–	

Product Name	Model Name	Description		Number of Occupied Points (points) [I/O Assignment Module Type]	Current Consumption		Remark
					5VDC(A)	24VDC(A)	
Power supply module	A1S61PN	5VDC, 5A	100/200VAC input	–	–	–	Installed in the power supply slot of the main base and extension base.
	A1S62PN	5VDC, A/24VDC, 0.6A					
	A1S63P	5VDC, 5A	24VDC input				

* The parenthesized values are for those which is not compliant with CE.

POINT

(1) A USB port cannot be used with QCPU-A.
(2) A RS232/422 conversion cable is required to use the conventional peripheral devices (A6GPP, A8PUE, etc.).
Recommended cable: FA-CNV2402CBL (2m (6.56ft.)), FA-CNV2405CBL (5m (16.40ft.))
Contact: Mitsubishi Electric Engineering Corp.

Product Name	Model Name	Description	Number of Occupied Points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Input module	A1SX10	16-point 100 to 120 VAC input module	16 [16 input points]	0.05	–	
	A1SX10EU	16-point 100 to 120 VAC input module	16 [16 input points]	0.05	–	
	A1SX20	16-point 200 to 240 VAC input module	16 [16 input points]	0.05	–	
	A1SX20EU	16-point 200 to 240 VAC input module	16 [16 input points]	0.05	–	
	A1SX30	16-point 12/24VDC, 12/24VAC input module	16 [16 input points]	0.05	–	
	A1SX40	16-point 12/24VDC input module	16 [16 input points]	0.05	–	
	A1SX40-S1	16-point 24VDC input module	16 [16 input points]	0.05	–	
	A1SX40-S2	16-point 24VDC input module	16 [16 input points]	0.05	–	
	A1SX41	32-point 12/24VDC input module	32 [32 input points]	0.08	–	
	A1SX41-S1	32-point 24VDC input module	32 [32 input points]	0.12	–	
	A1SX41-S2	32-point 24VDC input module	32 [32 input points]	0.08	–	
	A1SX42	64-point 12/24VDC input module	64 [64 input points]	0.09	–	
	A1SX42-S1	64-point 24VDC input module	64 [64 input points]	0.16	–	
	A1SX42-S2	64-point 24VDC input module	64 [64 input points]	0.09	–	
	A1SX71	32-point 5/12/24VDC input module	32 [32 input points]	0.075	–	
	A1SX80	16-point 12/24VDC sink/source input module	16 [16 input points]	0.05	–	
	A1SX80-S1	16-point 24VDC sink/source input module	16 [16 input points]	0.05	–	
	A1SX80-S2	16-point 24VDC sink/source input module	16 [16 input points]	0.05	–	
	A1SX81	32-point 12/24VDC sink/source input module	16 [16 input points]	0.08	–	
	A1SX81-S2	32-point 24VDC sink/source input module	32 [32 input points]	0.08	–	
	A1SX82-S1	64-point 24VDC sink/source input module	32 [32 input points]	0.16	–	

Product Name	Model Name	Description	Number of Occupied Points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Output module	A1SX10	16-point relay contact output module (2A)	16 [16 output points]	0.12	0.09	
	A1SY10EU	16-point relay contact output module (2A)	16 [16 output points]	0.12	0.10	
	A1SY14EU	12-point relay contact output module (2A)	16 [16 output points]	0.12	0.10	
	A1SY18A	8-point relay contact output module (2A) for independent contacts	16 [16 output points]	0.24	0.075	
	A1SY18AEU	8-point relay contact output module (2A) for independent contacts	16 [16 output points]	0.24	0.075	
	A1SY22	16-point triac output module (0.6A)	16 [16 output points]	0.27	(200VAC) 0.002	
	A1SY28A	8-point triac output module (1A) All points independent	16 [16 output points]	0.13	–	
	A1SY40	16-point 12/24VDC transistor output module (0.1A) sink type	16 [16 output points]	0.27	0.008	
	A1SY40P	16-point 12/24VDC transistor output module (0.1A) sink type	16 [16 output points]	0.08	0.011	
	A1SY41	32-point 12/24VDC transistor output module (0.1A) sink type	32 [32 output points]	0.50	0.008	
	A1SY41P	32-point 12/24VDC transistor output module (0.1A) sink type	32 [32 output points]	0.14	0.012	
	A1SY42	64-point 12/24VDC transistor output module (0.1A) sink type	64 [64 output points]	0.93	0.008	
	A1SY50	16-point 12/24VDC transistor output module (0.5A) sink type	16 [16 output points]	0.12	0.06	
	A1SY60	16-point 24VDC transistor output module (2A) sink type	16 [16 output points]	0.12	0.015	
	A1SY60E	16-point 12/24VDC transistor output module (2A) source type	16 [16 output points]	0.20	0.01	
	A1SY68A	8-point 5/12/24/48VDC transistor output module (2A) sink/source type All points independent	16 [16 output points]	0.11	–	
	A1SY71	32-point 5/12VDC transistor output module (0.016A) sink type	32 [32 output points]	0.40	0.15	
	A1SY80	16-point 12/24VDC transistor output module (0.8A) source type	16 [16 output points]	0.12	0.02	
	A1SY81	32-point 12/24VDC transistor output module (0.1A) source type	32 [32 output points]	0.50	0.008	
	A1SY82	64-point 12/24VDC transistor output module (0.1A) source type	64 [64 output points]	0.93	0.008	

Product Name	Model Name	Description	Number of Occupied Points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
I/O combined module	A1SH42	32-point 12/24VDC input module 32-point 12/24VDC transistor output module (0.1A) sink type	32 [32 output points]	0.50	0.008	
	A1SH42-S1	32-point 24VDC input module 32-point 12/24VDC transistor output module (0.1A) sink type	32 [32 output points]	0.50	0.008	
	A1SX48Y18	8-point 24VDC input module 8-point relay contact output module (2A)	16 [16 output points]	0.085	0.045	
	A1SX48Y58	8-point 24VDC input module 8-point 12/24VDC transistor output module (0.5A)	16 [16 output points]	0.06	0.06	
Dynamic input module	A1S42X	16/32/48/64 points 12/24VDC dynamic input module	Specified number of points [Input Specified number of points]	0.08	–	
Dynamic output module	A1S42Y	16/32/48/64 points 12/24VDC dynamic output module	Specified number of points [Output Specified number of points]	0.18	0.055	
Blank cover	A1SG60	Dust-proof cover for unused slot	16 [Empty]	–	–	
Dummy module	A1SG62	16-point, 32-point, 48-point, 64-point selectable module	Specified number of points [Input Specified number of points]	–	–	
Pulse catch module	A1SP60	Short ON-time pulse input module (pulse with a minimum of 0.5ms) 16 input points	16 [16 output points]	0.055	–	
Analog timer module	A1ST60	A module whose timer setting value can be changed for different volumes (0.1 to 1.0s, 1 to 10s, 10 to 60s, 60 to 600s) Analog timer 8 points	16 [16 output points]	0.055	–	
Interrupt module	A1SI61	Interrupt module for specifying the interrupt program (16-point interrupt input)	32 [32 special points]	0.057	–	
High-speed counter module	A1SD61	32-bit signed binary 50kBPS, 1 channel	32 [32 special points]	0.35	–	
	A1SD62	24-bit signed binary, 2 channel 100kPPS, DC input transistor output (sink type)	32 [32 special points]	0.1	–	
	A1SD62D	24-bit signed binary, 2 channel 200kPPS, difference input transistor output (sink type)	32 [32 special points]	0.25	–	
	A1SD62D-S1	24-bit signed binary, 2 channel 200kPPS, difference input transistor output (sink type)	32 [32 special points]	0.27	–	
	A1SD62E	24-bit signed binary, 2 channel 100kPPS, DC input transistor output (source type)	32 [32 special points]	0.1	–	

Product Name	Model Name	Description	Number of Occupied Points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
A/D converter module	A1S64AD	4 to 20mA/0 to 10V 4 analog channels	32 [32 special points]	0.4	–	
	A1S68AD	4 to 20mA/0 to 10V 8 analog channels	32 [32 special points]	0.4	–	
D/A converter module	A1S62DA	4 to 20mA/0 to 10V 2 analog output channels	32 [32 special points]	0.8	–	
	A1S68DAV	-10 to 10V input 8 analog output channels	32 [32 special points]	0.65	–	
	A1S68DAI	4 to 20mA input 8 analog output channels	32 [32 special points]	0.85	–	
Analog I/O module	A1S63ADA	Analog input, 2 channels, simple loop control is allowed 1 analog output channels	32 [32 special points]	0.8	–	
	A1S66ADA	Analog input, 4 channels, simple loop control is allowed 2 analog output channels	32 [32 special points]	0.21	0.16	
Temperature control module	A1S62RD3	For connecting to Pt100 (3-wire) Temperature input, 2 channels	32 [32 special points]	0.49	–	
	A1S62RD4	For connecting to Pt100 (4-wire) Temperature input, 2 channels	32 [32 special points]	0.39	–	
	A1S68TD	Thermocouple input, 8 channels	32 [32 special points]	0.32	–	
	A1S62TCTT-S2	Transistor output, thermocouple input 2 channels/module PID control: ON/OFF pulse	32 [32 special points]	0.19	–	
	A1S62TCTTBW-S2	Transistor output, thermocouple input 2 channels/module PID control: ON/OFF pulse, wire breakage detection function	32 [32 special points]	0.28	–	
	A1S62TCRT-S2	Transistor output, platinum RTD (Resistance Temperature Detector) input 2 channels/module PID control: ON/OFF pulse	32 [32 special points]	0.19	–	
	A1S62TCRTBW-S2	Transistor output, platinum RTD input 2 channels/module PID control: ON/OFF pulse, wire breakage detection function	32 [32 special points]	0.28	–	
	A1S64TCTT-S1	Transistor output, thermocouple input 4 channels/module PID control: ON/OFF pulse or 2 positioning control	32 [32 special points]	0.33	–	
	A1S64TCTTBW-S1	Transistor output, thermocouple input 4 channels/module PID control: ON/OFF pulse or 2 positioning control Heater wire breakage detection function	32 [32 special points]	0.42	–	

Product Name	Model Name	Description	Number of Occupied Points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Temperature control module	A1S64TCRT-S1	Transistor output, thermocouple input 4 channels/module PID control: ON/OFF pulse or 2 positioning control	32 [32 special points]	0.33	–	
	A1S64TCRTBW-S1	Transistor output, thermocouple input 4 channels/module PID control: ON/OFF pulse or 2 positioning control Heater wire breakage detection function	32 [32 special points]	0.42	–	
	A1S64TCTRT	Transistor output, thermocouple input, or platinum RTD input [For standard control] 4 channels/module PID control: ON/OFF pulse or 2 positioning control [For heating-cooling control] 2 channels/module PID control: ON/OFF pulse	32 [32 special points]	0.33 (0.19)*	–	*:When the temperature conversion function of unused channels are not used in the heating-coolA1S64TCTRTBWing control
	A1S64TCTRTBW	Transistor output, thermocouple input, or platinum RTD input [For standard control] 4channels/module PID control: ON/OFF pulse or 2 positioning control [For heating-cooling control] 2 channels/module PID control: ON/OFF pulse, wire breakage detection function	32 [32 special points]	0.39 (0.25)*	–	
Computer link module	A1SJ71UC24-R2	Computer link function RS-232C, 1 channel	32 [32 special points]	0.1	–	Accessible within the AnACPU device range
	A1SJ71UC24-PRF	Computer link function, printer function RS-232C, 1 channel	32 [32 special points]	0.1	–	
	A1SJ71UC24-R4	Computer link function, multidrop link function RS-422/RS-485, 1 channel	32 [32 special points]	0.1	–	
Ethernet interface module	A1SJ71E71N3-T	10 Base-T	32 [32 special points]	0.69	–	
	A1SJ71E71N-T	10 Base-T	32 [32 special points]	0.56	–	
	A1SJ71E71N-B2	10 Base 2 (for Cheapernet)	32 [32 special points]	0.66	–	
	A1SJ71E71N-B5	10 Base 5 (for Ethernet)	32 [32 special points]	0.57	–	
Intelligent communication module	A1SD51S	BASIC (interpreter/compiler) RS-232C, 2 channel RS-422/RS485, 1 channel	32 [32 special points]	0.4	–	

Product Name	Model Name	Description	Number of Occupied Points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Positioning module	A1SD70	1 axis positioning control, speed control and speed-positioning control, analog voltage output for speed-positioning control (0 to ± 10V)	48 (First half 16 empty points, Second half 32 special points)	0.3	–	
	A1SD75P1-S3	For positioning control, pulse output, 1-axis	32 [32 special points]	0.7	–	
	A1SD75P2-S3	For positioning control, pulse output, 2-axes (independent, 2-axis simultaneous, linear interpolation, circular interpolation)	32 [32 special points]	0.7	–	
	A1SD75P3-S3	For positioning control, pulse output, 3-axis (independent, 3-axis simultaneous, 2-axis linear interpolation, 2-axis circular interpolation)	32 [32 special points]	0.7 *	–	* When different driver is connected: 0.78A
	A1SD75M1	For positioning control, digital output for MR-H-B/MR-J-B/MR-J2-B, 1-axis SSCNET	32 [32 special points]	0.7	–	
	A1SD75M2	For positioning control, digital output, for MR-H-B/MR-J-B/MR-J2-B, 2-axis SSCNET (Independent, 2-axis simultaneous, linear interpolation, circular interpolation)	32 [32 special points]	0.7	–	
	A1SD75M3	For positioning control, digital output, for MR-H-B/MR-J-B/MR-J2-B, 3-axis SSCNET (independent, 3-axis simultaneous, 2-axis linear interpolation, 2-axis circular interpolation)	32 [32 special points]	0.7	–	
ID interface module	A1SD35ID1	ID interface module One reader/writer modules can be connected.	32 [32 special points]	0.25	0.17	
	A1SD35ID2	ID interface module Two reader/writer modules can be connected.	32 [32 special points]	0.25	0.33	
MELSECNET(II) data link module	A1SJ71AP21	For the master and local stations of MELSECNET(II) data link system (for the optical fiber cable)	32 [32 special points]	0.33	–	Access is allowed within the device range of the AnACPU.
	A1SJ71AP21-S3	For the master and local stations of MELSECNET(II) data link (for the GI-type optical fiber cable)	32 [32 special points]	0.33	–	
	A1SJ71AR21	For the master and local stations of MELSECNET(II) data link system (for the coaxial cable)	32 [32 special points]	0.8	–	
MELSECNET/B data link module	A1SJ71AT21B	For the master and local stations of MELSECNET/B data link system	32 [32 special points]	0.66	–	
	A1SJ72T25B	For the remote I/O station of MELSECNET/B data link system	–	0.3	–	
B/NET data link module	A1SJ71B62-S3	Master module for B/NET	32 [32 special points]	0.08	–	

Product Name	Model Name	Description	Number of Occupied Points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
MELSECNET/10 data link module	A1SJ71LP21	For the control, master, and normal stations of the MELSECNET/10 data link module system (For the dual loop SI-type optical fiber cable)	32 [32 special points]	0.65	–	
	A1SJ71LP21GE	For the control, master, and normal stations of the MELSECNET/10 data link module system (For the dual loop GI-type optical fiber cable)	32 [32 special points]	0.65	–	
	A1SJ71BR11	For the control, master, and normal stations of the MELSECNET/10 data link module system (For the single bus coaxial cable)	32 [32 special points]	0.80	–	
	A1SJ71LR21	For the control, master, and normal stations of the MELSECNET/10 data link module system (For the coaxial cable dual loop)	32 [32 special points]	1.14	–	
CC-Link system master module	A1SJ61BT11	For the master and local stations of the CC-Link data link system (For the twisted pair shield cable only)	32 [32 special points]	0.40	–	
MELSECNET/ MINI-S3 master module	A1SJ71PT32-S3	For MELSECNET/MINI-S3 master stations (max. 64 stations). Performs remote I/O and remote terminal control of a total of 512 I/O points.	I/O mode 32 [32 special points]	0.35	–	
			Expanded mode 48 [48 special points]			
MELSECNET-I/O LINK master module	A1SJ51T64	MELSECNET-I/O LINK master station. Controls I/O LINK remote I/O module of a maximum of 64 stations and a total of 128 I/O points. If only a few remote I/O units are used, perform I/O assignment with a peripheral device to decrease the number of occupied I/O points to 16, 32, or 48.	64 [64 output points]	0.115	0.09	
S-LINK interface module	A1SJ71SL92N	Master module for S-LINK I/O total 128 points	32 [32 special points]	0.20	–	
AS-I interface module	A1SJ71AS92	Master module for AS-I I/O total 496 points	32 [32 special points]	0.15	–	
Positioning detection module	A1S62LS	Absolute positioning detection module	32 [32 special points]	0.55	–	
Programmable controller easier monitoring module	A1SS91	Programmable controller easier monitoring module	16 [16 output points]	0.08	–	
Memory card interface module	A1SD59J-S2	Memory card interface module	32 [32 special points]	0.05	–	The current consumption describes in connecting A1SD59J-MIF.
Simulation module	A6SIM-X64Y64	An I/O simulation unit used connected to the base module Debugging can be executed without connecting the I/O module to the base module. Use an extension cable of the AnS series between the main base of the AnS series and the A6SIM-X64Y64.	64 [64 input points] 64 [64 output points]	TYP. 0.3 (When all points "ON")	–	

Product Name	Model Name	Description	Number of Occupied Points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
PROFIBUS interface module	A1SJ71PB92D	PROFIBUS-DP master module	32 [32 special points]	0.56	–	
	A1SJ71PB96F	PROFIBUS-FMS interface module	32 [32 special points]	0.56	–	
Device net interface module	A1SJ71DN91	Device net master module	32 [32 special points]	0.24	–	
MODBUS interface module	A1SJ71UC24-R2-S2	RS-232Ctype MODBUS interface module	32 [32 special points]	0.1	–	
	A1SJ71UC24-R4-S2	RS-422/485type MODBUS interface module	32 [32 special points]	0.1	–	
Graphic operation terminal	GOT1000 Series	For the applicable GOT models, refer to GOT1000 Series Connection Manual (Mitsubishi Products).	–	–	–	–
	GOT-A900 Series	For the applicable GOT models, refer to GOT-A900 Series User's Manual. (GT Work2 Version2/GT Designer2 Version2 Compatible Connection System Manual)	–	–	–	–

Product Name	Model Name	Description	Applicable Model
Connector/terminal block converter unit	A6TBXY36	For the sink-type input module and sink-type output module. (standard type)	A1SX41(S1/S2), A1SX42(S1/S2), A1SY41, A1SY41P, A1SY42, A1SY82, A1SH42(S1)
	A6TBXY54	For the sink-type input module and sink-type output module. (2-wire type)	
	A6TBX70	For the sink-type input module (3-wire type)	A1SX41(S1/S2), A1SX42(S1/S2), A1SH42(S1)
	A6TBX36-E	For the source-type input module (standard type)	A1SX71, A1SX82-S1, A1SX81(S2)
	A6TBY36-E	For the source-type output module (standard type)	A1SY81, A1SY82
	A6TBX54-E	For the source-type input module (2-wire type)	A1SX71, A1SX82-S1, A1SX81(S2)
	A6TBY54-E	For the source-type output module (2-wire type)	A1SY81, A1SY82
	A6TBX70-E	For the source-type input module (3-wire type)	A1SX71, A1SX82-S1, A1SX81(S2)
Cable for connector/terminal block converter unit	AC05TB	0.5m (1.64ft.) for the sink module	A6TBXY36 A6TBXY54 A6TBX70
	AC10TB	1m (3.28ft.) for the sink module	
	AC20TB	2m (6.56ft.) for the sink module	
	AC30TB	3m (9.84ft.) for the sink module	
	AC50TB	5m (16.40ft.) for the sink module	
	AC80TB	8m (26.24ft.) for the sink module	
	AC100TB	10m (32.81ft.) for the sink module	
	AC05TB-E	0.5m (1.64ft.) for the source module	A6TBX36-E A6TBY36-E A6TBX54-E A6TBY54-E A6TBX70-E
	AC10TB-E	1m (3.28ft.) for the source module	
	AC20TB-E	2m (6.56ft.) for the source module	
	AC30TB-E	3m (9.84ft.) for the source module	
	AC50TB-E	5m (16.40ft.) for the source module	
Relay terminal unit	A6TE2-16SRN	For the sink-type output module	A1SY41, A1SY41P, A1SY42, A1SH42(S1)
Cable for connecting the relay terminal unit	AC06TE	0.6m (1.97ft.) long	A6TE2-16SRN
	AC10TE	1m (3.28ft.) long	
	AC30TE	3m (9.84ft.) long	
	AC50TE	5m (16.40ft.) long	
	AC100TE	10m (32.81ft.) long	
Terminal block cover for the A1S I/O module and the special module	A1STEC-S	Slim-type terminal block cover for the A1S I/O module and the special module (terminal block connector type).	All terminal block connector type modules

Product Name	Model Name	Description	Applicable Model
IDC terminal block adapter	A1S-TA32	IDC terminal block adapter for 32 points 0.5mm^2 (AWG20)	A1SX41(S1/S2), A1SX71, A1SY41, A1SY41P, A1SY71
	A1S-TA32-3	IDC terminal block adapter for 32 points 0.3mm^2 (AWG22)	
	A1S-TA32-7	IDC terminal block adapter for 32 points 0.75mm^2 (AWG18)	
Terminal block adapter	A1S-TB32	For 32 points, conversion into Europe type terminal block	A1SX41(S1/S2), A1SX71, A1SY41, A1SY41P, A1SY71
40-pin connector	A6C0N1	Soldering-type, straight out	Sink type (40p FCN)
	A6C0N2	Crimp type, straight out	
	A6C0N3	Insulation-displacement type, flat cable	
	A6CON4	Soldering-type, straight/diagonal out	
3-pin D-sub connector	A6C0N1E	Soldering-type, straight out	Source type (37p D-sub)
	A6C0N2E	Crimp type, straight out	
	A6C0N3E	Insulation-displacement type, flat cable	

REMARK

Toa Electric Industrial CO., LTD. provides I/O cables with connectors, which can connect to 40-pin connector (A1SX41, A1SX42, A1SY41, A1SY41P, A1SY42, A1SY42P, etc.) or 37-pin D-sub connector (A1SX81, A1SY81) of I/O modules.

Contact:
TOA ELECTRIC INDUSTRIAL CO., LTD.

(2) Peripheral device

Product Name	Model Name	Remark	
Plasma hand-held graphic programmer	A6PHP-SET	• A6PHP main unit • SWGP-GPPA..... GPP function start-up floppy disk for the A series • SWGP-GPPK..... GPP function start-up floppy disk for the K series • SW0-GPPU..... User floppy disk (2DD) • AC30R4..... 3m (9.84ft.)-long RS-422 cable	
Intelligent GPP	A6GPP-SET	• A6GPP main unit • SWGP-GPPA..... GPP function start-up floppy disk for the A series • SWGP-GPPK..... GPP function start-up floppy disk for the K series • SW0-GPPU..... User floppy disk (2DD) • AC30R4..... 3m (9.84ft.)-long RS-422 cable	
Composite video cable	AC10MD	• Connection cable for the monitor display of the A6GPP screen: 1m (3.28 ft.)long	
RS-422 cable	AC30R4	3m (9.84ft.) long	Connection cable for between the CPU main module and A6GPP/A6PHP
	AC300R4	30m (98.43ft.) long	
User floppy disk	SW0S-USER	2HD-type	Floppy disk for storing user programs (3.5-inch, pre-formatted)
Cleaning floppy disk	SW0-FDC	For A6GPP/A6PHP	Floppy disk for cleaning the floppy disk drive
Optional keyboard for A6PHP	A6KB-SET-H	• A6KB keyboard • AC03R4H..... 0.3m (0.98 ft.)-long connection cable between A6KB and A6PHP • A6KB-C..... Key sheet for the GPP mode of A6KB	
Optional keyboard for A6GPP	A6KB-SET	• A6KB keyboard • AC03R4L..... 0.3m (0.98 ft.)-long connection cable between A6KB and A6GPP • A6KB-C..... Key sheet for the GPP mode of A6KB	

Product Name	Model Name	Remark
Printer	K6PR-K A7NPR-S1	• For printing out program circuit diagrams and various lists
RS232C cable	AC30R2	Connection cable for between A6GPP/A6PHP and printer (K6PR-K, A7NPR-S1, and a general-purpose printer with RS-232C interface) 3m (9.84ft.) long
Printer paper	K6PR-Y K7PR-Y	Printer paper for K6PR(S1) and K6PR-K. 9-inch paper 2000 sheets per unit. Printer paper for A7PR and A7NPR 11-inch paper Unit: 2000 sheets
Inked ribbon for K6PR(K)	K6PR-R	Replacement inked ribbon for K6PR-K.
Programming module	A7PUS	Read/write of the program is performed by connecting to the CPU main module with a RS-422 cable (AC30R4-PUS). (5VDC 0.4A)
	A8PUE	Read/write of the program is performed by connecting to the CPU main module or a RS-422 cable (AC30R4-PUS, AC20R4-A8PU). (5VDC 0.4A)
RS-422 cable	AC30R4-PUS	Connection cable for between the CPU main module and A7PUS, A8PUE. 3m (9.84ft.) long
	AC20R4-A8PU	Connection cable for between the CPU main module and A8PUE. 2m (6.56ft.) long
Data access module	A6DU-B	• Used for monitoring the devices of the CPU module, changing the setting values/ current values, and displaying the operation status. (5VDC 0.23A) • Connect to the CPU module with an AC30R4-PUS cable.
Modem interface module	A6TEL	• An interface module which connects the CPU module and the modem. Using a telephone line, the communication is performed between a remote peripheral device and the CPU module. (5VDC 0.2A) • Connect to the CPU module with an AC30R4-PUS cable.
RS-422 cable	AC30R4 AC300R4	Connection cable for between the CPU main module and A6WU 3m/30m (9.84 ft./ 98.43 ft.) long.
	AC03WU	Connection cable for between the A6PHP main unit and A6WU 0.3m (0.98ft.) long

2.4 System Configuration Overview

There are four system configuration types as follows:

(1) Stand-alone system ..... A system with a main base module only, or with a main base system and an extension base module connected with the extension cable.

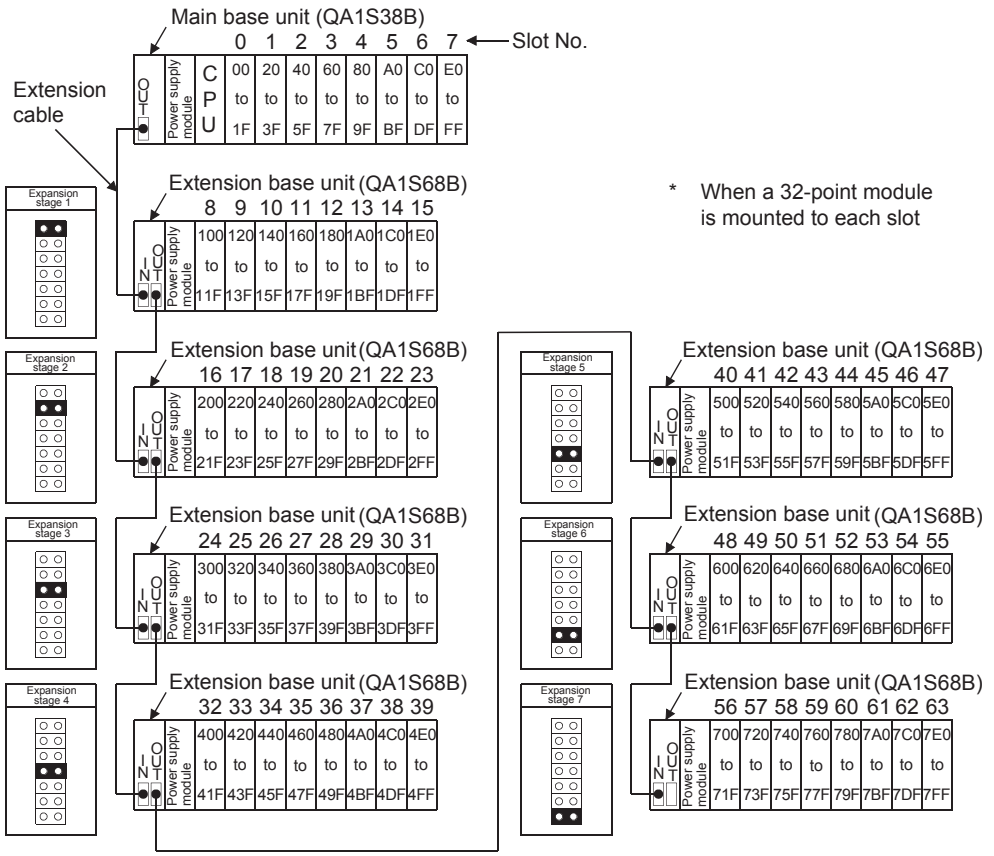
(2) Network system ..... A system that controls multiple programmable controllers and remote I/O modules

(3) Computer link system ..... A system that communicates between the CPU module and the computer (personal computer, etc.) by using an A1SJ71UC24 computer link module

(4) Composite system ..... A system that has a combination of a network system and a computer link system

The details of the system configuration, number of I/O points, I/O number assignment, etc., of a stand-alone system are listed on the next page.

2.4.1 QCPU-A system

System configuration	
Maximum number of extension stages	7th extension stage
Maximum number of I/O modules	64 modules
Maximum number of I/O points	4096 points
Main base unit model name	QA1S33B, QA1S35B, QA1S38B
Extension base unit model name	QA1S65B, QA1S68B
Extension cable model name	QC06B, QC12B, QC30B, QC50B, QC100B
Precautions	(1) Up to 7 extension base units can be added. (2) Limit the total length of the extension cable to 13.2m (43.40ft.) or less. (3) When using extension cables, keep them away from the main circuit cables (high voltage, large current). (4) Assign the extension stage numbers in ascending order. Do not assign two or more modules to one stage. (5) Connect the extension cable from OUT of the extension cable connector of the base unit to in of the connector of the next extension base unit.

3 SPECIFICATIONS

The general specification common to various modules is shown.

<table>
<tr><th>Item</th><th colspan="6">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="6">0 to 55℃</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="6">-20 to 75℃</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="6">10 to 90 % RH, No-condensing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="6">10 to 90 % RH, No-condensing</td></tr>
<tr><td rowspan="5">Vibration resistance</td><td rowspan="5">Compliant with JIS B 3502, IEC 61131-2</td><td></td><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep count</td></tr>
<tr><td rowspan="2">Under intermittent vibration</td><td>10 to 57Hz</td><td>－</td><td>0.075mm (0.003inches)</td><td rowspan="2">10 times each in X, Y, Z directions.</td></tr>
<tr><td>57 to 150Hz</td><td>9.8m/s^2</td><td>－</td></tr>
<tr><td rowspan="2">Under continuous vibration</td><td>10 to 57Hz</td><td>－</td><td>0.035mm (0.001inches)</td><td rowspan="2">－</td></tr>
<tr><td>57 to 150Hz</td><td>4.9m/s^2</td><td>－</td></tr>
<tr><td>Shock resistance</td><td colspan="6">Conforming to JIS B 3502, IEC 61131-2 (147m/s^2 , 3 times in each of 3 directions XYZ)</td></tr>
<tr><td>Operation ambiance</td><td colspan="6">No corrosive gasses</td></tr>
<tr><td>Operating altitude*3</td><td colspan="6">2000m (6562ft.) max.</td></tr>
<tr><td>Installation location</td><td colspan="6">Control panel</td></tr>
<tr><td>Over voltage category*1</td><td colspan="6">II max.</td></tr>
<tr><td>Pollution degree*2</td><td colspan="6">2 max.</td></tr>
<tr><td>Equipment category</td><td colspan="6">Class I</td></tr>
</table>

*1 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.
Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.

*2 This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

*3 Do not use or store the programmable controller in the environment when the pressure is higher than the atmospheric pressure at sea level.
Otherwise, malfunction may result.
To use the programmable controller in high-pressure environment, please contact your local Mitsubishi representative.

4 CPU MODULE

4.1 Performance Specifications

Performance specifications of CPU modules are shown below.

Performance specifications

Item		Model			Remark
		Q02CPU-A	Q02HCPU-A	Q06HCPU-A	
Control method		Stored program repeat operation			
I/O control mode		Refresh mode			Partial direct I/O are available by the instructions.
Programming language		Language dedicated to sequence control			
		Relay symbol language, logic symbol language, MELSAP-II (SFC)			
Processing speed (sequence instruction)		79ns/step	34ns/step		
Constant scanning (Program startup with a specified interval)		Can be set between 10ms and 190ms in 10ms units.			Set in special register D9020.
Memory capacity*1		144k bytes of built-in RAM + 144k bytes of built-in ROM			
Program capacity (steps)	Main sequence program	Max. 28k steps		Max. 30k steps	Set in parameters.
	Sub sequence program	None		Max. 30k steps	
Number of I/O device points*2		8192 points (X/Y0 to X/Y1FFF)			The number of points usable in the program
Number of I/O points		4096 points (X/Y0 to X/YFFF)			The number of points which can be used for access to actual I/O modules

*1 Each memory capacity for the programmable controllers is the sum total of the parameters, T/C setting values, program capacities, file registers, comment points, sampling traces and status latches. The memory capacities are unchanged. The extension memories cannot be approved. For the calculation method of memory capacity, refer to Section 4.2.2.

*2 I/O devices of the actual number of I/O points or later can be used as the MELSECNET/10, MELSECNET(II)/B, MELSECNET/MINI or CC-Link.

Performance specifications (continued)

Item		Model			Remark
		Q02CPU-A	Q02HCPU-A	Q06HCPU-A	
Device points	Internal relay [M]	7144 points (M0 to M999, M2048 to M8191)			The range can be changed by parameters.
	Latch relay [L]	1048 points (L1000 to L2047)		Total 8192 shared by M, L, S	
	Step relay [S]	0 point (None for default)			
	Link relay [B]	8192 points (B0 to B1FFF)			
	Timer [T]	2048 points (Default: 256 points) •100ms timer (T0 to T199) ..... Setting time: 0.1 to 3276.7s •10ms timer (T200 to T255) ..... Setting time: 0.01 to 327.67s •100ms retentive timer (none for initial) .... Setting time: 0.1 to 3276.7s •Expansion timer (T256 to T2047) ..... Time set by word device (D, W, R) •1ms timer (None for initial)..... Setting time: 0.001 to 32.767s (The latter half of the retentive timer can be used by ZHTIME instruction.)			The range and number of points for use set by parameters (Refer to Section 4.2.1)
	Counter [C]	1024 points (Default: 256 points) •Normal counter (C0 to C255) ..... Setting range : 1 to 32767 times •Interrupt counter (none for default) .....C224 to C255 possible depending on setting •Expansion counter (C256 to C1023) ..... Count value set by word device (D,W,R)			The range and number of points for use set by parameters (Refer to Section 4.2.1)
	Data register [D]	8192 points (D0 to D8191)			
	Link register [W]	8192 points (W0 to W1FFF)			
	Annunciator [F]	2048 points (F0 to F2047)			Fault finding device
	File register [R]	8192 points (R0 to R8191)			Points set by parameters
	Accumulator [A]	2 points (A0, A1)			
	Index register [V, Z]	14 points (V, V1 to V6, Z, Z1 to Z6)			
	Pointer [P]	256 points (P0 to P255)			
	Interrupt pointer [I]	32 points (I0 to I31)			
	Special relay [M]	256 points (M9000 to M9255)			
	Special register [D]	256 points (D9000 to D9255)			

Performance specifications (continued)

Item	Model			Remark
	Q02CPU-A	Q02HCPU-A	Q06HCPU-A	
Comment	Max. 4032 points (Set with the unit of 64 points)			Set in parameters.
Expanded comment	Max. 3968 points (Set with the unit of 64 points)			
Switch output mode from STOP to RUN	Select "Set the output status at STOP to RUN. (Default)" or "Output after operation execution."			Set in parameters.
Self-diagnostics function	Watchdog error supervision (watchdog timer fixed to 200ms) Error detection in the memory, CPU, I/O, battery, etc.			Refer to Section 4.1.4 for details.
Operating mode when there is an error	Select STOP or continue			Set in parameters. (refer to Section 4.2.1)
Start-up method at RUN	Initial start (upon power supply on/power restoration after power failure, automatic restart by turning the "RUN" switch of the CPU or on.)			
Latch (power failure compensation) range	L1000 to L2047 (default) (Possible to setup latch ranges for L, B, T, C, D, W)			Range set by parameters.
Remote RUN/PAUSE contacts	Possible to setup one contact poin for each of RUN/PAUSE from X0 to X1FFF.			Set in parameters.
Print title entry	YES (128 characters)			Set in parameters.
Keyword registration	YES			Set in parameters.
I/O assignment	Possible to register number of occupied I/O points and module model names.			
Step operation	Possible to execute or stop sequence program operations.			Refer to Section 4.3.
Interrupt processing	Possible to operate an interrupt program by the interrupt module or constant period interrpt signal.			
Data link	MELSECNET/10, MELSECNET(II)/B			
Clock function	Year, month, day, hour, minute, second, day of the week (automatic detection of the leap year) Accuracy • -3.18 to + 5.25s(TYP. + 2.12s)/d at 0℃ • -3.93 to + 5.25s(TYP. + 1.90s)/d at 25℃ • -14.69 to + 3.53s(TYP. - 3.67s)/d at 55℃			
Allowable momentary power failure period	Depending on the power supply modules			Refer to Section 5.1
5VDC internal current consumption	0.60A	0.64A		
Weight	0.20kg			
External dimensions	98mm (3.86inches)(H) × 27.4mm (1.08inches)(W) × 89.3mm (3.52inches)(D)			

CAUTION

When the conventional system software packages and peripheral devices are used, the usable device range are limited.
Details are provided in Section 2.2.3.

4.1.1 Overview of operation processing

An overview of processing when starting power supply for the CPU module to execution of the sequence program is explained.
CPU modules processing may be categorized roughly into the following four kinds:

(1) Initial processing
This is a preprocess to execute sequence operations, and is performed only once upon power-on or reset.
(a) Resets the I/O module and initialize it.
(b) Initializes the range of data memory for which latch is not set up (turns off the bit device and sets the word device to 0).
(c) Allocates I/O address of the I/O module automatically based on the I/O module number or the position of installation on the extension base unit.
(d) Execute the self-diagnostics check for the parameter setting and the operation circuit. (Refer to Section 4.1.4)
(e) For the control station of the MELSECNET/10 or the master station of MELSECNET (II)/B, sets the network/link parameter information to the network/ data-link module, and commences the network communication/data link.

(2) Refresh processing of I/O module
Executes the refresh processing of I/O module.
(Refer to the ACPU/QCPU-A (A Mode) Programming Manual (Fundamentals).)

(3) Operation processing of a sequence program
Executes the sequence program from step 0 to the END instruction written in the programmable controller CPU.

(4) END processing
This is a post-process to finish one cycle of operation processing of the sequence program and to return the execution of the sequence program to the step 0.
(a) Executes self-diagnosis checks, such as a fuse blown, a module verify, and a low battery.
(Refer to Section 4.1.4)
(b) Updates the current value of the timer, sets the contact on/off, updates the current value of the counter and sets the contact to on.
(Refer to the ACPU/QCPU-A (A Mode) Programming Manual (Fundamentals).)
(c) Executes the data exchange between the programmable controller CPU and a computer link module (e.g.A1SJ71UC24-R2), when there is a data read or write request from the computer link module.

(d) Executes the refresh processing when there is a refresh request from the network module or link module.

(e) When the trace point setting of sampling trace is by each scan (after the execution of END instruction), stores the device status for which it is setup into the sampling trace area.

(f) By setting link information, I/O storage device, etc. of the MELSECNET/MINI-S3 to the parameters, auto refresh processing of the A1SJ71PT32-S3 master module is performed. (Refer to Section 4.2.6)

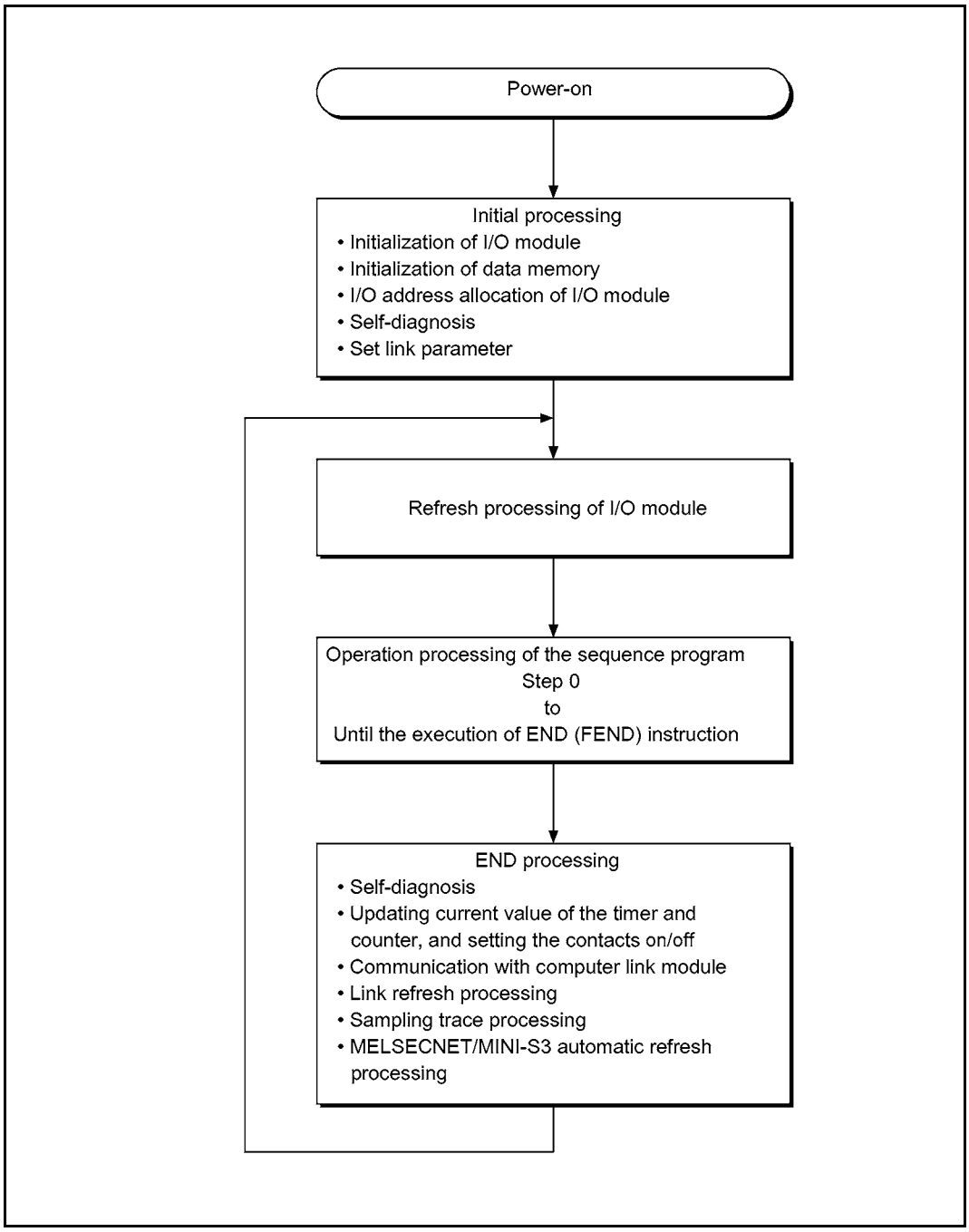

Power-on
Initial processing
• Initialization of I/O module
• Initialization of data memory
• I/O address allocation of I/O module
• Self-diagnosis
• Set link parameter
Refresh processing of I/O module
Operation processing of the sequence program
Step 0
to
Until the execution of END (FEND) instruction
END processing
• Self-diagnosis
• Updating current value of the timer and counter, and setting the contacts on/off
• Communication with computer link module
• Link refresh processing
• Sampling trace processing
• MELSECNET/MINI-S3 automatic refresh processing

Figure 4.1 CPU module operation processing

POINT

When executing the FROM/TO instruction for the special function module frequently in short scan time, it may cause the target special function module operation error.
When executing FROM/TO instruction to the special function module, set the processing time and converter time by using such as a timer and a constant scan function of the special function module.

4.1.2 Operation processing of RUN, STOP, PAUSE, and STEP-RUN

The programmable controller CPU has four kinds of operation status: RUN status, STOP status, PAUSE status, and step operation (STEP-RUN) status.
Operation processing of programmable controller CPU in each operation status is explained.

(1) RUN status operation processing
  (a) The repetition of sequence program operation in the order from step 0 → END (FEND) instruction → step 0 is called the RUN status.
  (b) When entering the RUN status, the output status saved by STOP is output depending on the output mode setting of parameter upon STOP → RUN.
  (c) Processing time from switching STOP → RUN to the start of the sequence program operation is usually one to three seconds, although it may vary depending on the system configuration.

(2) STOP status operation processing
  (a) The termination of operation of the sequence program by the use of the RUN/STOP key switch, the remote STOP, or at the execution of STOP instruction is called the STOP status. (Refer to Section 4.3)
  (b) When entering the STOP status, it saves the output status and sets all output points to OFF. Data memories except for output (Y) are retained.

(3) PAUSE status operation processing
  (a) The termination of operation of sequence program while retaining output and data memories is called the PAUSE status. (Refer to Section 4.3)

(4) Step operation (STEP-RUN) operation processing
  (a) Step operation is an operation mode wherein operation processing of a sequence program can be paused/resumed by each instruction from peripheral device(s). (Refer to Section 4.3)
  (b) Since an operation processing is paused while retaining the output and data memories, condition of the execution can be confirmed.

(5) Operation processing of programmable controller CPU when RUN/STOP key switch is operated

RUN/STOP key switch operation	Programmable controller CPU operation processing				Remark
	Operation processing of a sequence program	External output	Data memory		
			M, L, S, T, C, D	Y	
RUN → STOP	Executes up to the END instruction, then stops.	OS saves the output status, and sets all the output points to OFF.	Retains the condition immediately prior to entering the STOP status.	OS saves the output status, and sets all the output points to off.	
STOP → RUN	Starts.	Determined by the output mode of the parameter upon STOP → RUN.	Starts operations from the condition immediately prior to entering the STOP status.	Determined by the output mode of the parameter upon STOP → RUN.	

POINT

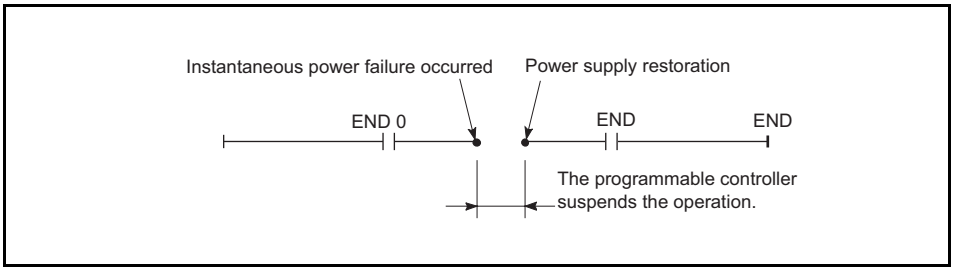
1. Whether in the RUN state, STOP state or PAUSE state, programmable controller CPU is performing the following:
   - Refresh processing of I/O module
   - Data communication with computer link module
   - Link refresh processing.

   Thus, even in the STOP or PAUSE status, monitoring or testing I/O with peripheral devices, reading or writing from a computer link module, and communication with other stations by MELSECNET/10, MELSECNET/MINI-S3 are possible.
2. STEP-RUN executes the END processing when executes the END (FEND) instruction during step operation.
   For current value update of the timer, the programmable controller adds 1 by 1 scan on the 10ms timer and adds 1 by 10 scan on the 100ms timer.

4.1.3 Operation processing upon instantaneous power failure

The programmable controller CPU detects a momentary power failure when input power voltage supplied to the power supply module becomes lower than the specified range. When the programmable controller CPU detects an instantaneous power failure, the following operation processing is performed.

(1) When an instantaneous power failure shorter than allowable momentary power failure period occurred:
   (a) When an instantaneous power failure occurred, the operation processing is interrupted while the output status is retained.
   (b) When the instantaneous power failure is reset, the operation processing will be continued.
   (c) When an instantaneous power failure occurred and the operation was interrupted, measurement of the watchdog timer (WDT) continues. For instance, in the case that WDT is 200ms and the scan time is 190ms, if an instantaneous power failure of 15ms occurs, it causes the watchdog timer error.



Operation processing upon instantaneous power failure

(2) When an instantaneous power failure longer than the allowable momentary power failure period occurred:
   The programmable controller CPU performs the initial start.
   The operation processing is the same as power-on or reset operation with the reset switch.

4.1.4 Self-diagnostics functions

Self-diagnosis is a function that a CPU module diagnoses itself for the presence of any abnormalities.

(1) While turning on the programmable controller power or when an error occurs in the programmable controller RUN, the error is detected and displayed, and the operation is stopped by the self-diagnostics function, which the CPU module performs, to prevent programmable controller malfunctions and give preventive maintenance.

(2) The CPU module stores the error occurred last to a special register D9008 as an error code, and stores further detailed error code to a special register D9091.

(3) Even with the power-off, the latest error information and 15 errors in the past are stored by battery backup.
With a GPP function software package for the AnUCPU, contents of up to 16 errors can be confirmed with the peripheral devices.
Reset (All clear) in the past error information can be performed by operating "latch clear" in the CPU module.
The following shows contents of the error information. (The error which occurred last):

(a) The time and date of error occurrences..... Year, month, day, hour, minute, second (Clock data)

(b) Error Code..... The content of the special register D9008

(c) Detailed error code..... The content of the special register D9001

(d) Error step and error module installation address..... The content of the special register D9010, D9000, D9002

(4) When detecting an error by self-diagnosis, QCPU takes action in the following modes:
- Mode wherein the programmable controller operation is stopped
- Mode wherein the programmable controller operation is continued

In addition, some errors can be skipped or stopped by setting parameters.

(a) When an operation stop error is detected by the self-diagnosis, the AnSHCPU stops the operation at error detection, and sets the all outputs(Y) to OFF.

(b) When an error of operation continued is detected, the only part of the program with the error is not executed while the other part is executed.
Also, in the case of module verify error, the operation is continued using the I/O address prior to the error.

Since error occurrence and error contents are stored in the special relay (M) and special register (D) at error detection, use in the program for preventing any malfunctions of the programmable controller or mechanical system especially in mode wherein the programmable controller operation is continued.

Error definition detected by the self-diagnosis are shown in the next page.

REMARK

(1) As to the LED indication message, the order of priority of the LED indication can be changed if CPU module is in the operation mode. (Error codes are stored in the special register.)

(2) When the special relay M9084 is on, checking on fuse blown, I/O verification and the battery are not performed. (Error codes are not stored in the special register.)

(3) The "Error indication of peripheral device" in the table of self-diagnostics functions are messages that is indicated by the programmable controller diagnosis of peripheral devices.

Self-diagnostics list

Diagnostic Item		Diagnostic Timing	CPU Module Status	Status of RUN LED	Error Message	Error Code (D9008)
Memory error	Instruction code check	When each instruction is executed	Stop	Flickering	INSTRCT CODE ERR.	10
	Parameter setting check	• When switching on or resetting • When switching from (STOP, PAUSE) to (RUN, STEP→RUN)			PARAMETER ERROR	11
	No END instruction	• When M9056 or M9057 is on • When switching from (STOP, PAUSE) to (RUN, STEP→RUN)			MISSING END INS	12
	Unable to execute instruction	• CJ SCJ JMP CALL(P) FOR to NEXT When each instruction is executed • When switching from (STOP, PAUSE) to (RUN, STEP→RUN)			CAN'T EXECUTE(P)	13
	Format (CHK instruction) check	• When switching from (STOP, PAUSE) to (RUN, STEP→RUN)			CHK FORMAT ERR.	14
	Unable to execute instruction	• When interruption occurs • When switching from (STOP, PAUSE) to (RUN, STEP→RUN)			CAN'T EXECUTE(I)	15

(To the next page)

Self-diagnostics list (continued)

Diagnostic Item		Diagnostic Timing	CPU Module Status	Status of RUN LED	Error Message	Error Code (D9008)
CPU error	RAM check	• When switching on or resetting • When M9084 is on during STOP	Stop	Flickering	RAM ERROR	20
	Operation circuit check	• When switching on or resetting			OPE.CIRCUIT ERR.	21
	Watchdog error supervision	• When END instruction is executed			WDT ERROR	22
	END instruction not executed	• When END instruction is executed			END NOT EXECUTE	24
	Main CPU check	Always			MAIN CPU DOWN	26, 60, 61
	Memory card error	• When END instruction is executed • When power is on			MEMORY CARD ERR.	16
I/O error	Module verify error *1 (Default: stop)	When END instruction is executed (However, not checked when M9084 is on.)	Stop/Run	Flickering/ On	UNIT VERIFY ERR.	31
	Fuse blown *1 (Default: stop)	When END instruction is executed (However, not checked when M9084 is on.)			FUSE BREAK OFF	32
Special function module error	Control bus check	When FROM/TO instruction are executed and bus error occurs	Stop	Flickering	CONTROL-BUS ERR.	40
	Special function module error	When FROM/TO instruction are executed			SP.UNIT DOWN	41
	Link module error	• When switching on or resetting • When switching from (STOP, PAUSE) to (RUN, STEP→RUN)			LINK UNIT ERROR	42
	I/O interrupt error	When interruption occurs			I/O INT.ERROR	43
	Special function module assignment error	• When switching on or resetting • When switching from (STOP, PAUSE) to (RUN, STEP→RUN)			SP.UNIT LAY.ERR.	44
	Special module access error *1 (Default: STOP)	When FROM/TO instruction are executed	Stop/Run	Flickering/ On	SP.UNIT ERROR	46
	Link parameter error	• When switching on or resetting • When switching from (STOP, PAUSE) to (RUN, STEP→RUN)	Run	On	LINK PARA.ERROR	47
Battery	Low battery	Always (However, not checked when M9084 is on.)	Run	On	BATTERY ERROR	70
Operation error *1 (Default: RUN)		When each instruction is executed	Stop/Run	Flickering/ On	OPERATION ERROR *2 [<CHK> ERROR□□□]	50

*1 Can be changed by the parameter settings of the peripheral devices.
*2 Displayed as a three-digit trouble code only for errors with the "CHK" instruction.

4.1.5 Device list

Device means a general name for such as a contact, coil and timer used on the program operations in a programmable controller.
The following shows usage ranges and device names of the programmable controller.
For * in the devices below, they can be used by setting the parameters on each peripheral device. Also, they can be changed the usage ranges assignment.
Set the parameters depending on the usage system and contents of the programs.
For the detailed setting for parameters, refer to Section 4.2.1 "List of parameter setting range".)

Device list

Device		Range of Usage (points)	Description of Device
		QCPU-A	
X	Input	X/Y0 to X/YFFF (4096 points)	Used for the supply programmable controller commands and data from the external devices such as push buttons, select switches, limit switches and digital switches.
Y	Output		Used to the output control results of the program to the external devices such as solenoids, magnetic switches, signal lights and digital display device.
X	Input	X/Y0 to X/Y1FFF(8192 points)	• Possible to use in a program from the I/O points usage range per each programmable controller (described above) up to 8192 points. (External outputs are not allowed.)
Y	Output		• Assigned for auto I/O refresh of MELSECNET/MINI-S3, remote I/O of MELSECNET/10, remote I/O of MELSECNET(B), or CC-Link.
M	Special relay	M9000 to M9255 (256 points)	An auxiliary relay which is used in a programmable controller set in advance for a special application.
	*Internal relay	M/L/S0 to M/L/S8191 (8192 points) 8192 points as a total of M, L, S	An auxiliary relay in a programmable controller which cannot output directly to external devices.
L	*Latch relay		An auxiliary relay in a programmable controller which cannot output directly to the external devices. Has the power failure compensation function.
S	*Step relay		Used in the same manner as the internal relay (M). Used as a relays to indicate the stage number of process stepping program, etc.
R	Link relay	B0 to B1FFF (8192 points)	An internal relay for data link and it cannot be output to external devices. The range not set by the link parameters can be used as a substitute for a data register.
F	Annunciator	F0 to F2047 (2048 points)	Used for error detection. Error detection programs are created in advance, and if it becomes on during RUN, the number is stored in a special register D.
T	*100ms timer	T0 to T2047 (2048 points) (Register for storing setting value(s) is required for T256 or later.)	• Up-timing-timer: there are four kinds: 100ms timer, 10ms timer, 100ms retentive timer and 1ms timer.
	*10ms timer		
	*100ms retentive timer		
	1ms timer		• 1ms timer uses the second half of the retentive timer with ZHTIME instruction.
C	*Counter	C0 to C1023 (1024 points) Interrupt counter: fixed C224 to C255 Register for storing setting value(s) is required for C256 or later.	Up-timing There are two kinds: an up-timing counter used in programmable controller programs, an interrupt counter used in counting the number of interrupts.
	*Interrupt counter		

Device list (continued)

Device		Range of Usage (points) QCPU-A	Description of Device
D	Data register	D0 to D8191 (8192 points)	Memory used to store data in a programmable controller
	Special register	D9000 to D9255 (256 points)	Data memory set up in advance for the special application
W	Link register	W0 to W1FFF (8192 points)	Register for a data link. The range not set by the link parameters can be used as a substitute for a data register.
R	*File register	R0 to R8191 (8192 points)	Used for expanding the data register. User memory area is used for this.
A	Accumulator	A0, A1 (2 points)	Data register used to store a operation result of basic and application instructions
Z V	Index register	V,V1 to V6,Z,Z1 to Z6(14 points)	Used for qualification of devices (X, Y, M, L, B, F, T, C, D, W, R, K, H, P)
N	Nesting	N0 to N7 (8 levels)	Indicates nesting structure of a master control.
P	Pointer	P0 to P255 (256 points)	Indicates destination of the branch instructions (CJ, SCJ, CALL, JMP).
I	Interrupt pointer	I0 to I31 (32 points)	When an interruption is generated, it shows the destination of the interrupt program corresponding to the interruption.
K	Decimal constant	K-32768 to K-32767 (16-bit instruction) K-2147483648 to K-32767 (32-bit instruction)	Used to set timer/counter, pointer number, interrupt pointer number, bit device digits, and values for basic and application instructions.
H	Hexadecimal	H0 to HFFFF (16-bit instruction) H0 to HFFFFFFFF (32-bit instruction)	Used to the set values for basic and application instructions.

REMARK

The step relay in the list above can be used in the same manner as the internal relay (M). For the program creation with two kinds of functions in one program, it is usable to divide the step relay (S) and internal relay (M) into a category of such as a function and usage in using.

4.2 Parameter Setting Ranges

Parameter contents of the CPU module and parameter setting ranges are explained below.

4.2.1 List of parameter setting range

Parameters are used for allocating the user memory area inside the CPU module, setting various functions and device ranges.
Parameters are usually stored in the first 3k bytes of the user memory area.
In the parameters, the network parameter for MELSECNET/10 is allocated and stored after the main sequence program area. (Refer to Section 4.2.2 for details.)
Parameters can be used with default values set in advance as shown below. These values can be changed within the setting ranges by using the peripheral devices in accordance with the intended use.

List of parameter setting range

<table>
<tr><th colspan="2" rowspan="2">Item</th><th rowspan="2">Default Value</th><th colspan="2">Setting Range</th></tr>
<tr><th>Q02CPU-A, Q02HCPU-A</th><th>Q06HCPU-A</th></tr>
<tr><td colspan="2">Main sequence program capacity</td><td>6k steps</td><td>1 to 28k steps
(1k step = in 2k-byte units)</td><td>1 to 30k steps
(1k step = in 2k-byte units)</td></tr>
<tr><td colspan="2">Subsequence program capacity</td><td>–</td><td>–</td><td>1 to 30k steps
(in 1k-step unit)</td></tr>
<tr><td colspan="2">File register capacity</td><td>–</td><td colspan="2">0 to 8k points (1k point = in 2k-byte units)</td></tr>
<tr><td colspan="2">Extension file register capacity</td><td>–</td><td colspan="2">1 block = 16k bytes
(Block No.1 through No.8, and block No.10 through No.28 (when using a memory card) can be set.)
[Automatically setup in an empty area in a memory based on the file register setting.]</td></tr>
<tr><td colspan="2">Comment capacity</td><td>–</td><td colspan="2">0 to 4032 points (unit: 64 points = 1k byte)
[When comment capacity is set up, 1k byte is added to the memory area.]</td></tr>
<tr><td colspan="2">Expanded comment capacity</td><td>–</td><td colspan="2">0 to 3968 points (unit: 64 points = 1k byte)</td></tr>
<tr><td colspan="2">Status latch</td><td>–</td><td colspan="2" rowspan="2">No parameter setting
(Performed by setting up extension file registers to store devices and result in each of status latch and sampling trace modes.
(Refer to the Type ACPU/QCPU-A (A Mode)(Fundamentals) Programming Manual.))</td></tr>
<tr><td colspan="2">Sampling trace</td><td>–</td></tr>
<tr><td rowspan="5">Latch range setting</td><td>Link relay (B)</td><td rowspan="5">• Latch: L1000 to L2047 only
• None for others</td><td colspan="2">B0 to B1FFF (in 1-point unit)</td></tr>
<tr><td>Timer (T)</td><td colspan="2">T0 to T255 (in 1-point unit)
T256 to T2047 (in 1-point unit)</td></tr>
<tr><td>Counter (C)</td><td colspan="2">C0 to C255 (in 1-point unit)
C256 to C1023 (in 1-point unit)</td></tr>
<tr><td>Data register (D)</td><td colspan="2">D0 to D8191 (in 1-point unit)</td></tr>
<tr><td>Link register (W)</td><td colspan="2">W0 to W1FFF (in 1-point unit)</td></tr>
<tr><td colspan="2">Settings for internal relay (M), latch relay (L), step relay (S)</td><td>M0 to M999
M2048 to M8191
L1000 to L2047
None for S</td><td colspan="2">M/L/S0 to M/L/S8191
(M, L, S are serial numbered.)</td></tr>
</table>

List of parameter setting range (continued)

Item		Default Value	Setting Range	
			Q02CPU-A, Q02HCPU-A	Q06HCPU-A
Timer settings	T0 to T255	T0 to T199 (100ms) T200 to T255(10ms)	• 256 points by 100ms, 10ms, and retentive timers (in 8-point units, in 16-point units only for 1ms) • All timers are serial numbered.	
	T256 to T2047	–	• 1792 points by 100ms, 10ms, and retentive timers (in 16-point units) • All timers are serial numbered. • Devices set: D, R, W (Setting required if 257 points or more.)	
Counter setting	Interrupt counter setting	–	• Sets whether to use interrupt counter (C224 to C225) or not.	
	Points used	256 points (C0 to C255)	• 0 to 1024 points (in 16-point units) • Devices set: D, R, W (Setting required if 257 points or more.)	
I/O number assignment		–	• 0 to 64 points (in 16-point units) ..... Input module/output module special function module/empty slot • Module model name can be registered.	
Remote RUN/PAUSE contact setting		–	• X0 to X1FFF • RUN/PAUSE.....1 point (PAUSE contact setting is not only allowed.)	
Operation mode when there is an error	Fuse blown	Continue	Stop/Continue	
	I/O verify error	Stop		
	Operation error	Continue		
	Special function module check error	Stop		
Data communication request batch processing		None	Yes/No	
Output mode switching at STOP → RUN		Set the output status at STOP to RUN	Output before STOP/after operation	
Print title entry		–	• 128 characters	
Keyword registration		–	• Up to 6 characters in hexadecimal (0 to 9, A to F)	
MELSECNET/ 10 link range setting	Number of link stations	–	Optical link.....Max. 64 stations Coaxial link.....Max. 32 stations	
	I/O (X/Y)		X/Y0 to X/Y1FFF (in 16-point unit)	
	Link relay (B)		B0 to B1FFF (in 16-point unit)	
	Link register (W)		W0 to W1FFF (in 1-point unit)	
Link range settings for MELSECNET II	Number of link stations	–	• 0 to 64 station(s)	
	I/O (X/Y)		X/Y0 to X/Y7FF (in 16-point units)	
	Link relay (B)		• B0 to BFFF (in 16-point units)	
	Link register (W)		• W0 to WFFF (in 1-point unit)	

List of parameter setting range (continued)

Item		Default Value	Setting Range	
			Q02CPU-A, Q02HCPU-A	Q06HCPU-A
Link range setting for MELSECNET/MINI, MELSECNET/MINI-S3	Number of supported modules	–	0 to 8 module(s)	
	Head I/O number		0 to FE0 (in 10H units)	
	Model name registration		MINI, MINI-S3	
	Transmitted and received data		X, M, L, B, T, C, D, W, R, none (16-point units for bit devices)	
	Number of retries		0 to 32 times	
	FROM/TO response specification		Link priority; CPU priority	
	Faulty station data clear specification		Retain/Clear	
	Faulty station detection		M, L, B, T, C, D, W, R, none (16-point units for bit devices)	
	Error No.		T, C, D, W, R	
	Number of total remote stations		0 to 64 station(s)	
	Sending status setting during communication error		Test message, OFF data, retention (sending data)	

4.2.2 Memory capacity setting (for main program, file register, comment, etc.)

QCPU-A has 144k bytes of user memory (RAM) as standard.
Parameters, T/C set values, main programs, MELSECNET/10 network parameters, expanded comment, file register, and comment data are stored in the user memory.

(1) Calculation of memory capacity
Determine the data types to be stored and the memory capacity with parameters before using the user memory.
Calculate the memory capacity according to Table 4.1.

Table 4.1 Parameter setting and memory capacity
(With Q02CPU-A/Q02HCPU-A)

Item		Setting Unit	Capacity Calculation Formula	Max. Available Memory Capacity			Write to ROM	Remark
Parameter		–	3k bytes (fixed)	3k bytes (fixed)		Total: 144k bytes	Available	
Main program	T/C set value	–	1k byte (fixed)	1k byte (fixed)				
	Sequence program	1k step	Number of steps × 2k bytes	56k bytes	Total: 60k bytes			
	Microcomputer program	1k byte	Preset number of bytes	54k bytes				Dedicated to SFC
MELSECNET/10 parameter		–	See note 3.	16k bytes				
Expanded comment		1k byte	Preset number of bytes (1k byte = 64 points)	63k bytes			Not available	*1
Extension file register (built-in)		8k points	Number of file register points × 2k bytes	128k bytes				
File register		1k point	Number of file register points × 2k bytes	16k bytes				
Comment		1k byte	Preset number of bytes (1k byte = 64 points)	64k bytes				*1
Extension file register (memory card)		8k points	Number of file register points × 2k bytes	304k bytes				

(With Q06HCPU-A)

Item		Setting Unit	Capacity Calculation Formula	Max. Available Memory Capacity			Write to ROM	Remark
Parameter		–	3k bytes (fixed)	3k bytes (fixed)		Total: 144k bytes	Available	
Main program	T/C set value	–	1k byte (fixed)	1k byte (fixed)				
	Sequence program	1k step	Number of steps × 2k bytes	60k bytes	Total: 60k bytes			
	Microcomputer program	1k byte	Preset number of bytes	58k bytes				Dedicated to SFC
MELSECNET/10 parameter		–	See note 2, 3.	16k bytes				
Subprogram	T/C set value	1k byte	1k byte	1k byte (fixed)				
	Sequence program	1k step	Number of steps × 2k bytes	60k bytes				
	Microcomputer program	–	5k bytes	5k bytes (fixed)			Not available	
Expanded comment		1k byte	Preset number of bytes (1k byte = 64 points)	63k bytes				*1
Extension file register (built-in)		8k points	Number of file register points × 2k bytes	128k bytes				
File register		1k point	Number of file register points × 2k bytes	16k bytes				
Comment		1k byte	Preset number of bytes (1k byte = 64 points)	64k bytes				*1
Extension file register (memory card)		8k points	Number of file register points × 2k bytes	304k bytes				

*1 When the capacity of comment or expanded comment is specified, the system occupies 1k byte for each.

*2 The capacity for network parameters of MELSECNET/10 changes depending on the contents set.
The area for the network parameters shall be secured in 2k-byte units based on the total of capacity for each setting.
The following shows the memory capacity of each network parameter:

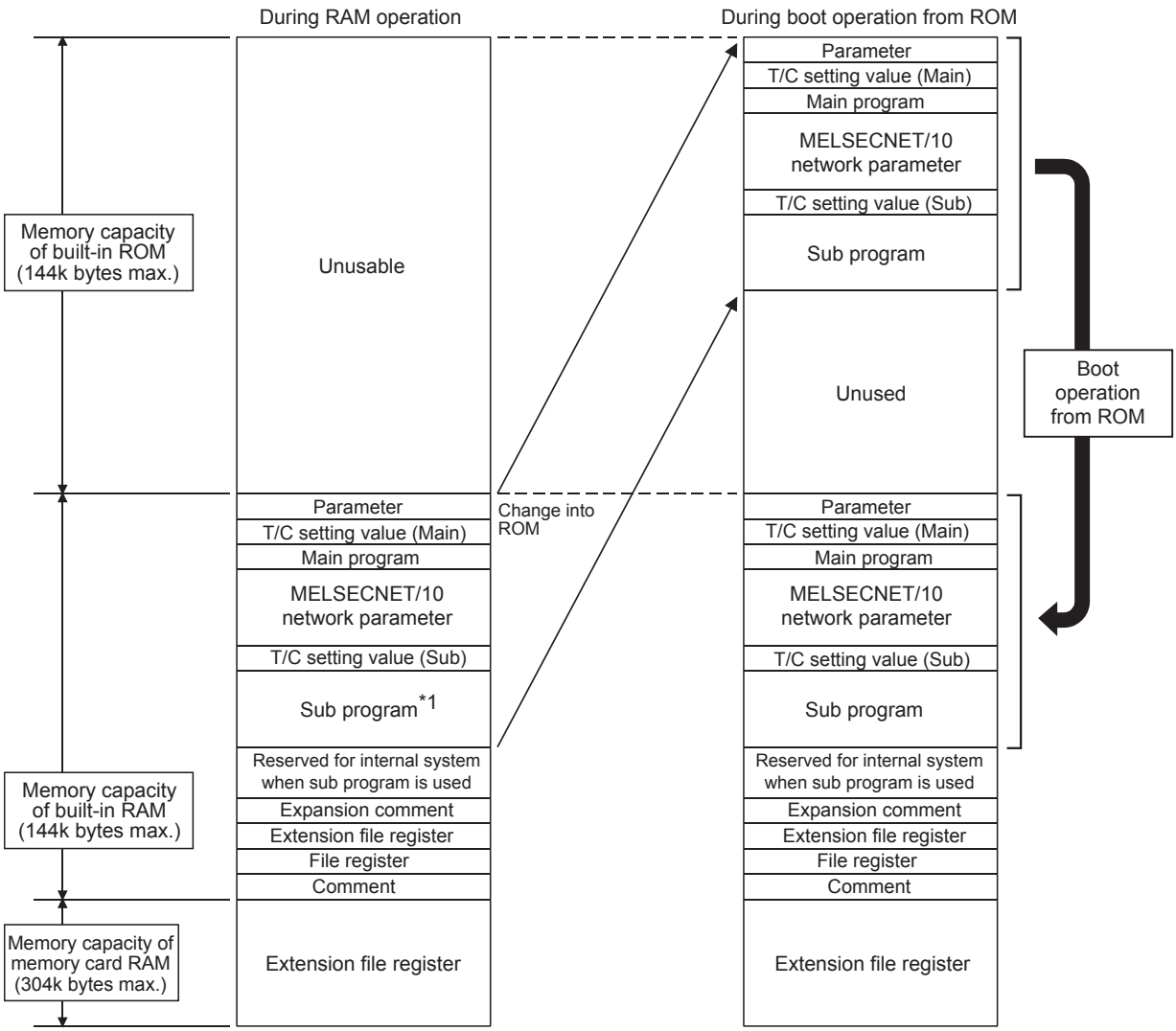
Item		Memory Capacity
Internal data		30 bytes
Routing parameter		390 bytes
Transfer parameter between data links		246 bytes
Common parameter	Control station	2164/module
	Remote master station	2722 bytes
Refresh parameter		92/module
Station inherent parameter		1490/module

The network parameter capacity for MELSECNET/10 is determined from the total of the memory capacities calculated from above.

Total of the Capacity (bytes)	Capacity of the Network Parameter Setting
30 to 2048	2k bytes
2049 to 4096	4k bytes
4097 to 6144	6k bytes
6145 to 8192	8k bytes
8193 to 10240	10k bytes
10241 to 12288	12k bytes
12289 to 14336	14k bytes
14337 to 16384	16k bytes

*3 When the MELSECNET(II) data link system is configured using a GPP function software package corresponding to the QCPU-A, 2k bytes (for 1k step) are occupied as a link parameter area.

(2) Order of user memory storage



*1 Sub programs can be used only with Q06HCPU-A.

POINT

The memory area for the sequence program for QCPU-A is the same as that for MELSECNET/10. Therefore, the remainder of subtracting the memory area used by MELSECNET/10 network parameters from the maximum 30k steps can be used for the memory area for the sequence program.
Note that the sequence program can use only up to 22k steps when the maximum 16k bytes are used for the MELSECNET/10 network parameters.

4.2.3 Setting ranges of timer and counter

(1) Timer setting range

(a) Default values of the timer setting ranges are as follows:

Timer points :256 points
100ms timer :T0 to T199
10ms timer :T200 to T255
Retentive timer :None

(b) When timer-use points are set to 257 or more, the default values will be as follows:

100ms timer :T0 to T199
10ms timer :T200 to T255
100ms timer :T256 to T2047

(c) The timer type can be arbitrarily set in serial numbers, with T0 to T255 in 8 point units, and T256 to T2047 in 16 point units.
By setting the timer points actually to be used, the timer processing time subsequent to the END instruction can be shortened.

(d) Timer setting values are as follows:

T0 to T255 : constant or word device (D)
T256 to T2047 : word device (D, W, R)
(Allocate a storage device for the set value by setting parameters.)

(2) Counter setting range

(a) Default values of counter setting ranges are as follows:

Counter points :256 points
Normal counter :C0 to C255
Interrupt counter :None

(b) When the counter-use points are set to 257 points or more, the default values will become as follows:

Normal counter :C0 to C255
Normal counter :C256 to C1024

(c) A counter which can be setup as an interrupt counter must be in the range C244 to C255 only, and any counters outside the range cannot be set up.
The setup is made with parameters in C224 to C255 by one point for the interrupt counter.
Any counter in the range C224 to C255 which is not set up as an interrupt counter can be used as a normal counter.

The interrupt counters in C224 to C255 are allocated to the interrupt pointers I0 to I31 as shown below, and count the occurrences of interrupts by those of I0 to I31.

Interrupt pointer	Interrupt counter	Interrupt pointer	Interrupt counter	Interrupt pointer	Interrupt counter	Interrupt pointer	Interrupt counter
I0	C224	I8	C232	I16	C240	I24	C248
I1	C225	I9	C233	I17	C241	I25	C249
I2	C226	I10	C234	I18	C244	I26	C250
I3	C227	I11	C235	I19	C243	I27	C251
I4	C228	I12	C236	I20	C244	I28	C252
I5	C229	I13	C237	I21	C245	I29	C253
I6	C230	I14	C238	I22	C246	I30	C254
I7	C231	I15	C239	I23	C247	I31	C255

(d) The counter-use points can be set arbitrarily by 16 points using the serial numbers.
By setting the counter which points to the number actually used, the counter processing time subsequent to the END instruction can be shortened.

(e) The counter set values are as follows:
C0 to C255 :constant or word device (D)
C256 to C1023 :word device (D, W, R)
(Allocate a storage device for the set value by setting parameters.)

POINT

When the timer-use points are set to 257 points or more or the counter-use points are set to 257 points or more, the set value storage devices (D, W, R) specified at the time of timer/counter use point setup are automatically set in the serial numbers.
<Example>
When the timer-use points are set to 512 points and the set value storage device is set to D1000, D equivalent to 256 points (D1000 to D1255) in T256 to T511 becomes the devices for the set values using the continuous numbers.

4.2.4 I/O devices

QCPU-A has 8192 I/O device points (X/Y0 to X/Y1FFF) each for input (X) and output (Y). There are actual I/O devices and remote I/O devices in this I/O range.

(1) Actual I/O device
This is the device range where an I/O module or special function module can be installed to the main base unit/extension base unit and controlled.
Q02CPU-A,
Q02HCPU-A, ・・・ 4096 points (X/Y0 to X/YFFF)
Q06HCPU-A

(2) Remote I/O device
The remote I/O devices, following the actual I/O devices or later, can be used for the following objectives:
(a) Allocate to a remote I/O station in the MELSECNET data link system.
(b) Allocate to a remote I/O station in the MELSECNET/10 network system.
(c) Allocate to the reception data storage device or transmission data storage device in the MELSECNET/MINI-S3's auto refresh setting.
(d) Use as the substitute to an internal relay (Substitute only for output device)

4.2.5 I/O assignment of special function module

By registering the model names of the following special function modules on I/O assignment with the peripheral devices, the dedicated instructions for special function modules can be used.

Model Name of Special Function Module	Setting for Model Name Registration
A1SJ71UC24-R2	A1SJ71UC24
A1SJ71UC24-R4	
A1SJ71UC24-PRF	
A1SJ71PT32-S3	A1SPT32S3

4.2.6 MELSECNET/MINI-S3 auto refresh processing

By setting link information, I/O storage device, etc. of the MELSECNET/MINI-S3 to the parameters, the module automatically communicates with the buffer memory area for the batch refresh send/received data of the A1SJ71PT32-S3/AJ71PT32-S3 master module (abbreviated as the master module hereafter).

Sequence programs can be created using the I/O devices allocated to send/received by the auto refresh setting. (The FROM/TO instructions are not required.)

POINT

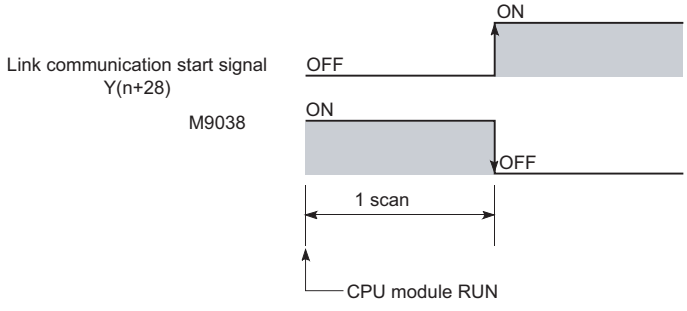
(1) Since up to 8 master modules can be set for auto refresh by the parameter, auto refresh is possible for up to 8 modules.
When 9 or more modules are desired, use the FROM/TO instruction in the sequence program from the 9th module.

(2) Since auto refresh is not possible with send/received data for the separate refresh I/O modules and for the remote terminal units No.1 to No.14, use them by the FROM/TO instructions.
However, the remote terminal units shown below are subject of auto refresh in the limited area:
- AJ35PTF-R2 RS-232C interface module
- AJ35PT-OPB-M1-S3 mount-type tool box
- AJ35PT-OPB-P1-S3 portable type tool box

(3) For the master modules set up for auto refresh, since the CPU module automatically turns on the link communication start signal Y(n+18) or Y(n+28), it is not necessary to turn it on from the sequence program.

(4) Auto refresh of I/O data is performed by batch after the CPU module executes the END instruction. (Auto refresh processing is performed when the CPU module is in the RUN/PAUSE/STEP-RUN status.)

(5) The master module may perform the processing while the link communication start signal Y(n+28) is off depending on the remote terminal units connected.
For instance, if the AJ35PTF-R2 RS-232C interface unit is used without protocol, it is necessary to write parameters to the parameter area (buffer memory address 860 to 929) while the link communication start signal is off.
Since the link communication start signal turns on after the CPU module enters the RUN status and one scan is performed, write the parameters during the first 1 scan.



(1) Parameter setting items, setting ranges and contents of auto refresh, as well as the buffer memory address of the master module which is used for exchanging data with the CPU modules are shown below.
Set the parameters for the number of use of the A1SJ71PT32-S3/AJ71PT32-S3 master modules.

I/O signal from the master module	Buffer memory address of the master module	Item	Setting range	Description
–	–	Number of master modules	1 to 8 module(s)	• Sets the total number of use of the master modules.
–	–	Head I/O No.	Number of I/O points of CPU module	• Sets the head I/O number where the master module is installed.
–	–	Model classification of MINI/MINI-S3	• MINI or MINI-S3	• MINI ..... In I/O mode (occupies 32 points) • MINI-S3 ..... In expansion mode (occupies 48 points)
–	0	Total number of remote I/O stations *2	0 to 64 station(s)	• Set only when MINI is set. • In MINI-S3, since the number of master module's initial ROMs becomes valid, the setting is not necessary. (When the setting is executed, ignore it).
–	110 to 141	Storage device for received data	• X • M, L, B, T, C, D, W, R, none (Bit device: multiples of 16)	• Sets the devices to store the received/send data for batch refresh. • Specify the head number of the device. • Occupies a part of the device area as the auto refresh area from the head of the device for the number of stations. (When setting the total number of remote I/O stations to 64, occupies 8 points/station × 64 stations=512 points: bit device.)*2 • Use of X/Y remote I/O range is recommended for devices.
–	10 to 41	Send data storage device	• Y • M, L, B, T, C, D, W, R, none (Bit device: multiples of 16)	
–	1	Number of retries	0 to 32 times	• Sets the number of retries upon the communication errors occurrence. • Error is not output when the communication is restored within the number of the retries set.

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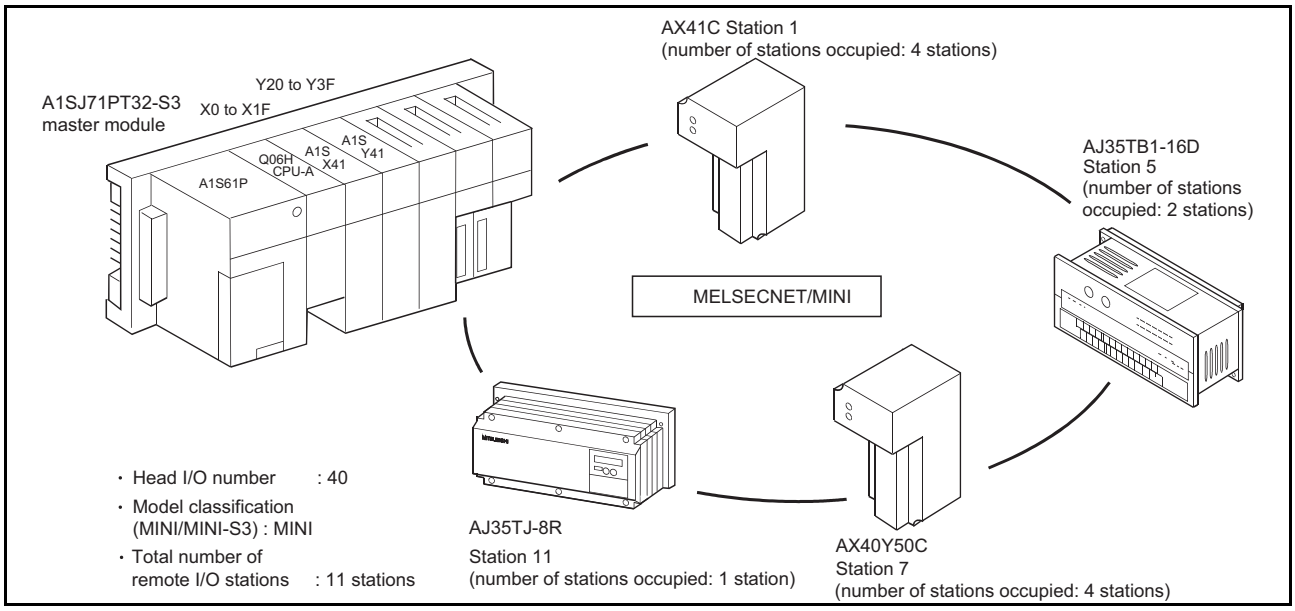
(continued)

I/O signal from the master module	Buffer memory address of the master module	Item	Setting range	Description
Y(n+1A)*1	–	FROM/TO response specification	Link priority, CPU priority (Priority selection of access to the master module buffer memory)	(1) Link priority ..... Link access by MINI-S3 has the priority. During the link access, FROM/TO is caused to wait. • Possible to read out the received data refreshed at the same timing. • The maximum wait time (0.3ms + 0.2ms × number of separate refresh stations) for the FROM/TO instruction may be generated. (2) CPU priority ..... Access by FROM/TO instruction of CPU has the priority. Even during the link access, it interrupts and accesses. • Depending on the timing, received data in the midst of I/O refresh may be read. • No wait time for FROM/TO instruction.
Y(n+1B)*1	–	Data clear specification for communication faulty station	Retention, clear (received data)	• Retention ..... Retains the received data for batch and separate refresh. • Clear ..... Sets all points to OFF.
–	100 to 103 195	Faulty station detection	M, L, B, T, C, D, W, R, none (Bit device: multiples of 16)	• Sets the head device to store the faulty stations detected data. • MINI ..... occupies 4 words; MINI-S3: occupies 5 words.
–	107 196 to 209	Error No.	T, C, D, W, R	• Sets the head device to store the error code at the error occurrence. • MINI ..... occupies 1 word; MINI-S3 ..... occupies (1+ number of remote terminal units) words.
–	4	Line error check setting (Line error)	• Test message sending • OFF data sending • Immediate data transmission before line errors	• Sets data sending method for verification of faulty area when the line errors occur.

*1 "n" is determined by the installation location of the master modules.
*2 When the total number of remote I/O station is odd, add 1 to the station number to obtain the occupied storage devices.

(2) Setting of the send/received data storage devices is explained using the system example shown below.
<Example> When the device X/Y400 and later are used as the remote I/O stations:



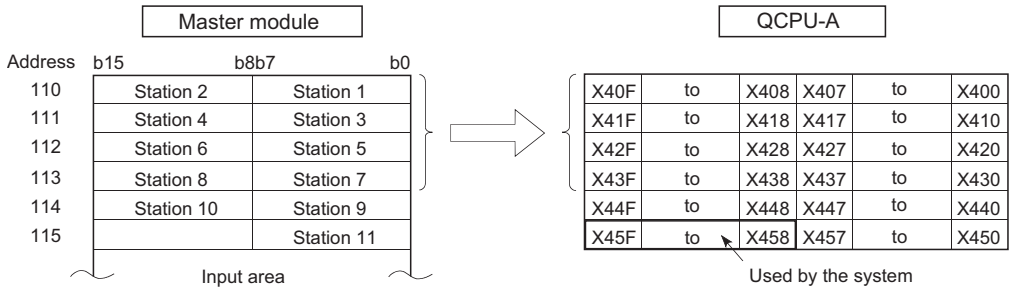
Sample parameter setting of the GPP function software package for the above system configuration is shown below:

Number of modules [1] (0-8)

I/O No.	0040
Model	MINI
Number of stations	11
Received	X0400
Send	Y0400
Retries	5
Response	CPU
Data clear	Clear
Detection	
Error number	
Error	Retain

The storage devices for the send/received data for the present system example are as follows:

(a) Storage device for received data



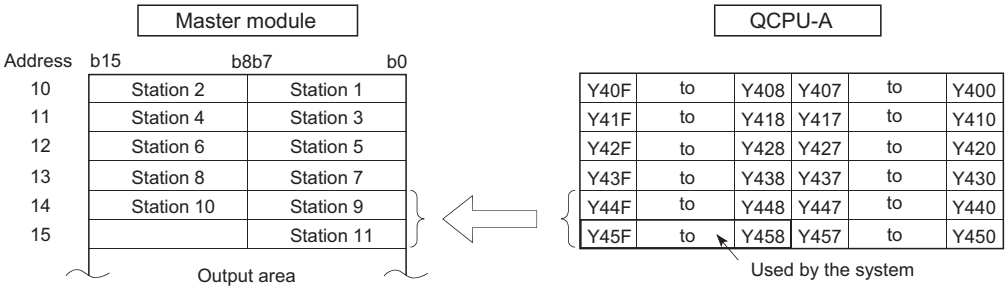
1) Set the device number (X400) for b0 of the station 1 as a received data storage device.
2) The received data storage device occupies from X400 to X45F.
For the present system example, since the total number of stations is odd, it is occupied for one extra station.

3) The device numbers of input modules connected are as follows:

Stations 1 to 4 AX41C → X400 to X41F
Stations 5 to 6 AJ35TB-16D → X420 to X42F
Stations 7 to 8 AX40Y50C → X430 to X43F

With respect to X440 to X45F, they are simultaneously refreshed, and turned off at all time.
Do not use X440 to X45F in the sequence program.

(b) Send data storage device



1) Set the device number (Y400) for b0 of the station 1 as a send data storage device.
2) The send data storage device occupies from Y400 to Y45F.
For the present system example, since the total number of stations is odd, it is occupied for one extra station.
3) The device numbers of output modules connected are as follows:

Stations 9 to 10 AX40Y50C → Y440 to Y44F
Station 11 AJ35TJ-8R → Y450 to Y457

With respect to Y400 to Y43F and Y458 to Y44F, they are simultaneously refreshed, but are not output.

POINT

(1) Set the send and received data storage devices so that device numbers are not overlapped.
When the received data storage device is set to B0 in the system configuration example, it occupies B0 to B5F as the device range.
Set the send data storage device to B60 or later.
When the send data storage device is set to B60, the device range will be B60 to BBF.

(2) If a bit device is specified as the send/received data storage device, the device number set must be a multiple of 16.

<Example>
X0, X10, ... X100, ...
M0, M16, ... M256, ...
B0, B10, ... B100, ...

(3) Device range used is (8 points) × (Number of stations).
When the number of stations is an odd number, extra 8 points are necessary.

4.3 Function List

Various functions of the CPU module are explained below.

Function (Application)	Description	Overview of Setting and Operation
Constant scan [•Program execution at constant intervals •Simplified positioning]	• Makes the processing time for a single scan in the sequence program constant. • Set the processing time within the range of 10ms to 190ms in 10ms units.	• Write to the special register D9020 by the sequence program.
Latch (power failure compensation) [Continuous control by data retention on power failure]	• When 20ms or longer power off, CPU reset or power off occur, data contents of the devices for which latches have been set up in advance are retained. • Latch-enabled devices: L, B, T, C, D, W • Latched data are stored in the CPU main module and backed up by batteries of the CPU main module.	• Latch devices and latch ranges are specified by setting of the peripheral device parameters.
Auto refresh of MELSECNET/MINI-S3 [Simplification of sequence program]	• Up to 8 A1SJ71PT32-S3 modules make I/O auto refresh communication with batch refresh send/received data area. • Auto refresh is executed in a batch after END processing. • I/O devices allocated directly by each module can program without FROM/TO instruction in the sequence program.	• Performed by setting auto refresh parameters of peripheral devices. (Refer to Section 4.2.6.)
Remote RUN/STOP [When performing RUN/STOP control from outside the programmable controller]	• When programmable controller CPU is in RUN (the RUN/STOP switch is set to RUN), performs the programmable controller's STOP/RUN from outside the programmable controller (external input, peripheral devices, computer) with a remote control.	• When performed with the external input (X), the parameter is set with a peripheral device. • When performed by a peripheral device, perform in the programmable controller test operation. • When performed via the computer link module, perform using the dedicated commands.
PAUSE [•When stopping operation of CPU while retaining the output (Y) •When performing RUN/ PAUSE control from outside the programmable controller]	• Stops the operation processing of programmable controller CPU while retaining the ON/OFF of all the outputs (Y). [When the operation is stopped by STOP, all the outputs (Y) are set to OFF.] • When programmable controller CPU is in RUN (the RUN/STOP switch is set to RUN), performs the programmable controller's STOP/RUN from outside the programmable controller CPU (external input, peripheral devices, computer) with a remote control.	• Performed by the peripheral devices in the programmable controller test operation. • When performed with the external input (X), perform the parameter setting with the peripheral device, set the special relay M9040 to ON with the sequence program, then perform.
Status latch [Check an operation and failure factor on each device when QCPU debugs or a failure condition is met.]	• The devices, for which status latch is set, are stored to the extension file register of the status latch area in the CPU main module when the status latch conditions are met. (The stored data are cleared by the latch clear operation.) • The criteria for the satisfied condition can be selected from when the SLT instruction is executed by the sequence program or when the device value matches the set condition.	• Using the peripheral devices, set the device to which the status latch is performed and the extension file register where the data are stored. • Using the peripheral devices, monitor the status latch data.

(To the next page)

(continued)

Function (Application)	Description	Overview of Setting and Operation
Sampling trace [Check the operation status of the set devices in chronological order when QCPU debugs or an abnormal behavior are caused.]	• With respect to a device for which the sampling trace is set up, the operating condition of the device is sampled for the number of times specified per scan or per period, and the results are stored in the extension file register for the sampling trace of the CPU main module. (The stored data are cleared by the latch clear operation.) • Sampling trace is performed by the STRA instruction in the sequence program.	• Using the peripheral devices, set the device to which the status latch is performed and the extension file register where the data are stored. • Using the peripheral devices, monitor the result of the sampling trace.
Step operation [Checks condition of program execution and behavior during debugging for example.]	• Executes operations of the sequence program with one of the conditions (1) to (5) given below, then stops. (1) Executes for each instruction. (2) Executes for each ladder block. (3) Executes by step intervals and loop counts. (4) Executes by loop counts and break points. (5) Executes when the device values matches.	• Selects a step operation condition for the peripheral device and executes.
Clock [Program control by clock data/ external display of clock data]	• Executes the clock operation installed to the CPU module. • Clock data: year, month, day , hour, minute, second, day of the week • When the clock data read request (M9028) is on, the clock data are read and stored in D9025 to D9028 by the clock element after the END processing of the sequence operation. • The clock elements are bucked up by a battery of theCPU main module.	• Sets data for D9025 to D9028 by a peripheral device, turns on M9025, then write to the clock element. • Writes to the clock element by the sequence program. (Dedicated instructions can be used.)
Priority order of LED indication [Changing priority order of indication/canceling indication]	• For ERR. LED indication except for operation stop, changing order of indication/canceling indication are executed.	• Writes data as to whether change order/cancel indication to D9038 or D9039 by the sequence program.
Self-diagnostics function [•An abnormal behavior of the CPU module •Preventive maintenance]	• When an error that matches one of the self-diagnostics items is generated at the CPU module power on or during RUN, QCPU prevents malfunctions by stopping the CPU module operation and indicating the error. • Stores the error codes corresponding to the self-diagnostics item.	• There are some self-diagnostics items with which the operation can be continued or stopped by the setting of peripheral device parameters. • Reads the error codes with the peripheral devices and performs troubleshooting. (Refer to Section 4.1.4.)
Boot operation from built-in ROM [Retains programs at power off.]	• Boot operation can be performed by booting parameters and sequence programs from the built-in ROM to the built-in RAM at start-up.	• Sets DIP switch 3 to on and power on or reset the module. (BOOT LED turns on.) (Refer to Section 4.4.1.)
1ms timer [Setting of 1ms timer]	• In addition to the conventional high-speed timer (10ms) and low-speed timer (100ms), a 1ms timer can be used.	• Adds ZHTIME, a 1ms timer setting instruction, during programming. (Refer to Section 4.4.2.)
Sequence accumulation time processing [Avoids influence of processing FROM/TO instruction on special function modules.]	• When the faster scan time affects the processing of FROM/TO instruction or the scan time for special function modules, a special relay (M9077) and special register (D9077) are used to avoid such problems.	• Uses M9077 and D9077 as interlock to execute FROM/TO instruction in the unit of several ms. (Refer to Section 4.4.3.)

4.4 Functions added to QCPU-A

This section describes the new functions added to QCPU-A (A mode) which are not available with A2USHCPU-S1.

4.4.1 Boot operation from built-in ROM

Boot operation can be performed by booting parameters and sequence programs from the built-in ROM to the built-in RAM at start-up.
The boot operation from the built-in ROM allows the retention of sequence programs without using batteries even when the power is off.
The following shows the procedure for the boot operation from the built-in ROM:

(1) Operation methods
There are two methods to operate QCUP-A: The RAM operation uses the built-in RAM. The boot operation uses the built-in ROM and boots parameters and sequence programs from the built-in ROM to the built-in RAM at start-up.
QCPU-A allows checking the current operation method by setting DIP switch 3 and M9073. The following table shows the setting combination.

Status of DIP switch 3	Status of M9073	
	OFF	ON
OFF	RAM operation D9076: 0 M9076: OFF	RAM operation D9076: 0 M9076: OFF
ON	RAM operation D9076: 1 M9076: OFF	Boot operation from built-in ROM D9076: 2 M9076: ON (Writing available with built-in ROM)

(a) Procedure for boot program (at start-up only)
How to boot program from the built-in ROM to the built-in RAM
1) Set DIP switch 3 to ON.
2) Turn on or reset the power supply. (BOOT LED turns on.)

(b) Procedure for write to built-in ROM
How to write a program from built-in RAM to built-in ROM
1) Set DIP switch 3 to ON and turn on M9073 → "2" is stored in D9076 and "1" is stored in M9076.
2) Start writing to the built-in ROM. (M9074 is turned on.)
3) When writing to the built-in ROM is successfully completed, M9075 turns on and D9075 stores the result of writing to the built-in ROM operation.(M9074 is turned on.)
4) To repeat writing, turn off M9074 once and turn it on again.
(When M9074 is turned off, M9075 is turned off.)

(c) Detailed contents of D9075

The following table shows the detailed contents of special register D9075.

Value in D9075	Description
00H	Successful completion
F1H	RAM operation (Set DIP switch 3 to ON.)
F2H	M9073 is off. (Turn on M9073.)
F3H	Failed erasing the built-in ROM
F4H	Failed writing to the built-in ROM
FEH	Checking erasing the built-in ROM
FFH	Writing to the built-in ROM

(d) Details of special relays during boot operation

The following table shows the details of special relays during boot operation

Special Relay	Name	Description	Details
M9073	Setting of writing to built-in ROM	OFF: Disables writing to ROM ON: Enables writing to ROM	To enable writing to the built-in ROM, turn on this relay. (DIP switch 3 should be set to ON.)
M9074	Request for writing to built-in ROM	OFF → ON: Starts writing to ROM	When this relay is turned from off to on, writing to the built-in ROM is started.
M9075	Successful completion of writing to built-in ROM	OFF: Failed writing to ROM ON: Successfully completed to writing to ROM	Turns on when writing to the built-in ROM is successfully completed. (The writing status is stored in D9075.)
M9076	Status of writing to built-in ROM	OFF: Writing to ROM disabled ON: Writing to ROM enabled	Turns on when writing to built-in ROM is enabled. (Turns on when DIP switch 3 is set to ON and M9075 is on.)

POINT

(1) Like the conventional A2USHCPU-S1, the available capacity of the standard memory (file register, comment, etc.) does not increase even if the ROM operation is selected.

(2) During the ROM operation, the program stored in the built-in RAM is overwritten with the program stored in the ROM.
Before starting the boot operation, be sure to back up the program with peripheral devices.

(3) The capacity of the built-in ROM is 144k bytes, the same as that of the built-in RAM. Writing is disabled when the total capacity of parameters and programs exceeds 144k bytes.
(Comments and file registers cannot be written to the built-in ROM.)

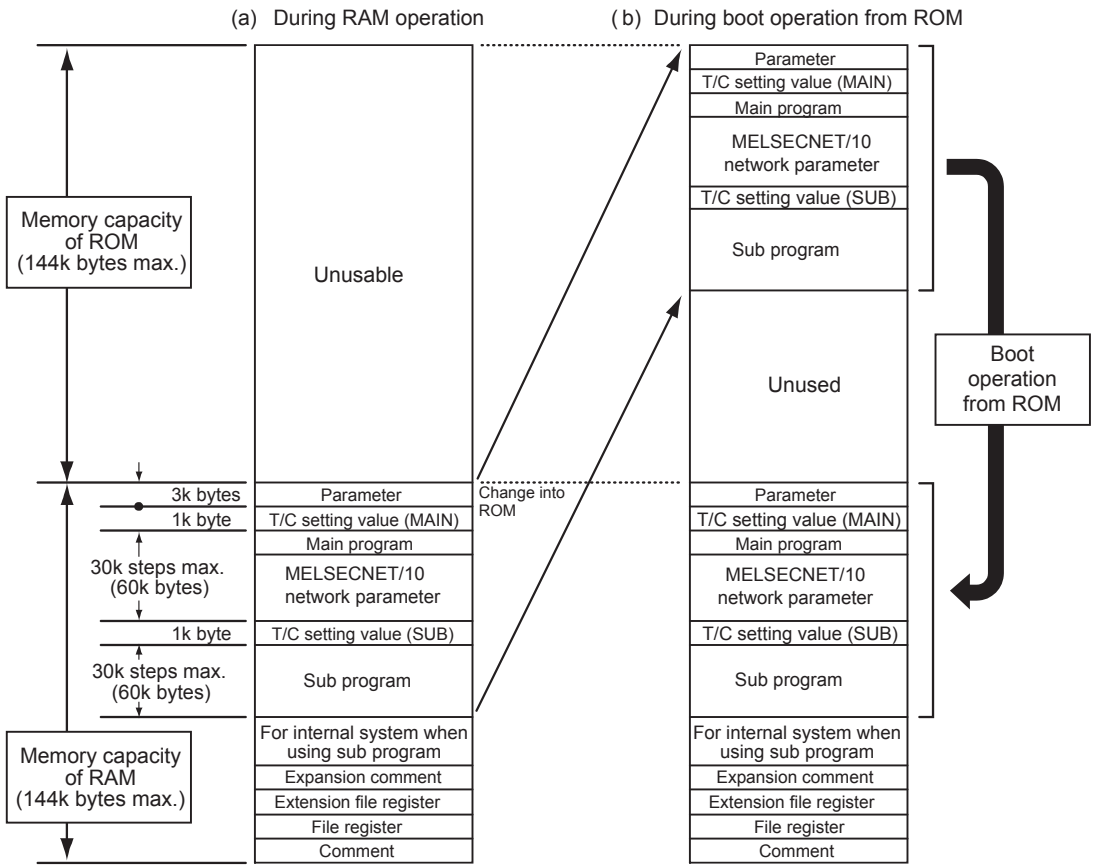
(4) When the attempt is made to boot parameters and programs from the built-in ROM to the built-in RAM but the built-in ROM does not contain proper programs, a parameter error occurs. (Detailed error code: 114)

(5) "Write during RUN" is performed to the built-in RAM. When the boot operation is used, be sure to write the program which is written to the built-in RAM during RUN, also to the built-in ROM.

(2) Configuration of user memory area

The following figure shows the configuration of the user memory area during the RAM operation and during the boot operation from the built-in ROM.

Configuration example of user memory area (in case of Q06HCPU)



4.4.2 Usage of 1ms timer

With QCPU-A, a 1ms timer can be used in addition to the conventional high-speed timer (10ms) and low-speed timer (100ms).

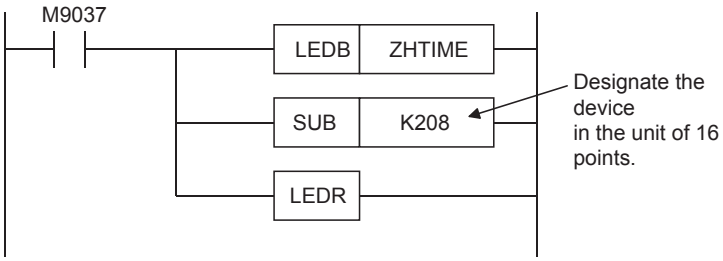
(1) Usage

Adding ZHTIME, a 1ms timer setting instruction, in a program enables the use of a 1ms timer. (The ZHTIME instruction must be written in the main program.)
The ZHTIME instruction is checked at start-up and at switching from STOP to RUN.
When this instruction exists in the main program, the 1ms timer can be used.
If the ZHTIME instruction does not exist in the main program, only the 100ms/10ms timer can be used, and the 1ms timer is disabled.
The number of occupied points is set as the total points of the 100ms timer, 10ms timer, retentive timer, and 1ms timer.
The area for the 1ms timer is reserved following that of the retentive timer.
Consequently, the constant specified with the ZHTIME instruction is designated as the device number following that of the retentive timer specified by parameters in the unit of 16 points.

(2) Use example of the ZHTIME instruction

The following shows the use example of the ZHTIME instruction.

Example) When the timer in 1ms is set at T208 or later:



(3) Accuracy of 1ms timer

The following table shows the accuracy of 1ms timer.

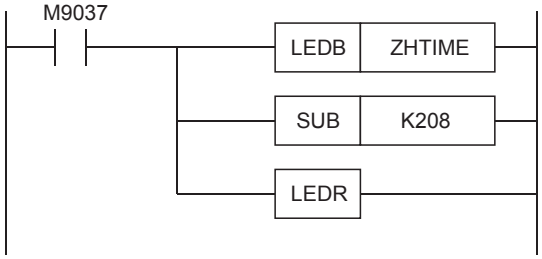
Timer Type	Scan Time	Accuracy
1ms	T $<$ 1ms	+2 scan time to -1ms
	T $\geqq$ 1ms	+2 scan time to -1 scan time

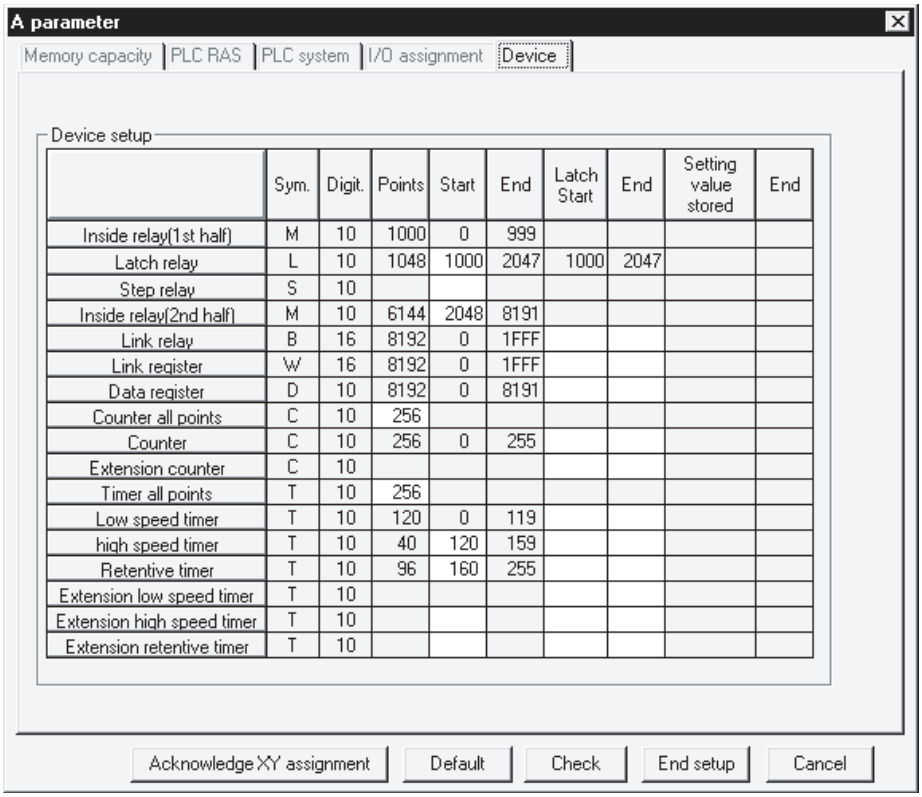
(4) Setting example

The followings shows the setting examples with and without the expansion timer:

(a) Setting example when the expansion timer is not used

Number of occupied points: 256 (100ms timer: 120 points, 10ms timer: 40 points, retentive timer: 48 points, 1ms timer: 48 points)

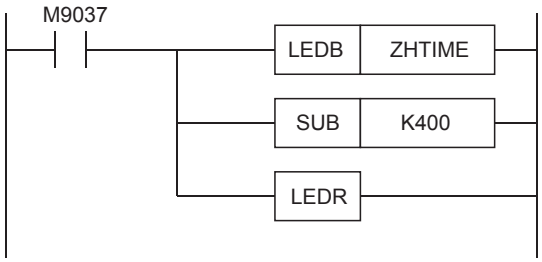




	Sym.	Digit.	Points	Start	End	Latch Start	End	Setting value stored	End
Inside relay(1st half)	M	10	1000	0	999				
Latch relay	L	10	1048	1000	2047	1000	2047		
Step relay	S	10							
Inside relay(2nd half)	M	10	6144	2048	8191				
Link relay	B	16	8192	0	1FFF				
Link register	W	16	8192	0	1FFF				
Data register	D	10	8192	0	8191				
Counter all points	C	10	256						
Counter	C	10	256	0	255				
Extension counter	C	10							
Timer all points	T	10	256						
Low speed timer	T	10	120	0	119				
high speed timer	T	10	40	120	159				
Retentive timer	T	10	96	160	255				
Extension low speed timer	T	10							
Extension high speed timer	T	10							
Extension retentive timer	T	10							

According to the setting above, the devices designated for the 100ms timer are T0 to T119, for the 10ms timer are T120 to T159, for the retentive timer are T160 to T207, and for the 1ms timer are T208 to T255.

(b) Setting example when the expansion timer is used
Number of occupied points: 512 (100ms timer: 240 points, 10ms timer: 80 points, retentive timer: 80 points, 1ms timer: 112 points)



A parameter

Memory capacity | PLC RAS | PLC system | I/O assignment | Device

Device setup

	Sym.	Digit.	Points	Start	End	Latch Start	End	Setting value stored	End
Inside relay(1st half)	M	10	1000	0	999				
Latch relay	L	10	1048	1000	2047	1000	2047		
Step relay	S	10							
Inside relay(2nd half)	M	10	6144	2048	8191				
Link relay	B	16	8192	0	1FFF				
Link register	W	16	8192	0	1FFF				
Data register	D	10	8192	0	8191				
Counter all points	C	10	256						
Counter	C	10	256	0	255				
Extension counter	C	10							
Timer all points	T	10	512					D0	255
Low speed timer	T	10	240	0	239				
high speed timer	T	10	16	240	255				
Retentive timer	T	10							
Extension low speed timer	T	10							
Extension high speed timer	T	10	64	256	319				
Extension retentive timer	T	10	192	320	511				

Acknowledge XY assignment | Default | Check | End setup | Cancel

According to the setting above, the devices designated for the 100ms timer are T0 to T239, for the 10ms timer are T240 to T319, for the retentive timer are T320 to T399, and for the 1ms timer are T400 to T511.

POINT

Note the following points to use the ZHTIME instruction.
(1) The ZHTIME instruction must be written in the main program.
(2) The ZHTIME instruction must be designated in the unit of 16 points.
(3) The number of occupied points designated in the timer setting by parameters should include those for the 1ms timer.
(4) When the range for the timer setting by parameters is between T256 and 2047, the initial device number to be used should be set at the item of the retentive timer between T256 and 2047.
The 100ms timer should be used as the retentive timer.

4.4.3 Sequence accumulation time processing

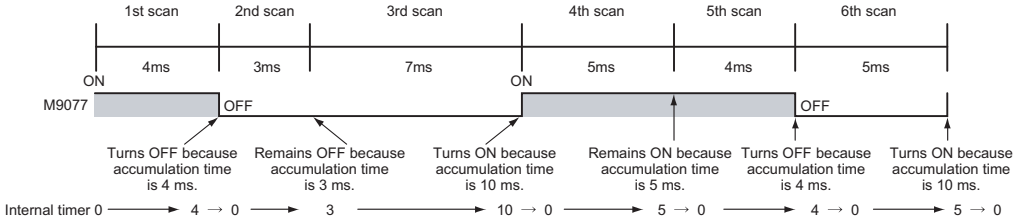
With QCPU-A, as the scan time becomes faster, it may affect the processing of FROM/TO instruction or the scan time for special function modules.
Such problems can be avoided by using the following special relay and special register as interlock and executing FROM/TO instruction in the unit of several ms.

(1) Procedure

Number	Name	Description	Details	Set by (Set at)
M9077	Sequence accumulation time measurement	ON: Timeout OFF: Not timeout	• Compares the setting value at D9077 with the time elapsed from the start of measurement (accumulation time) at every scan. Then, performs the following operations: Setting value≦Accumulation time : Turns on M9077 and clears the accumulation time. Setting value＞Accumulation time : Turns from on to off M9077 and clears the accumulation time. When M9077 is already off, clears the accumulation time. * When 1 to 255 is designated at D9077, M9077 is turned on at the first scan. * When a value other than 1 to 255 is designated at D9077, the value in D9077 is reset to 0 and M9077 is always turned off.	System
D9077	Sequence accumulation time measurement	Accumulation time setting	• Stores the accumulation time used by M9077. Setting range: 1 to 255ms (Default: 5ms) * When a value other than 1 to 255ms is designated, the value in D9077 is reset to 0.	User

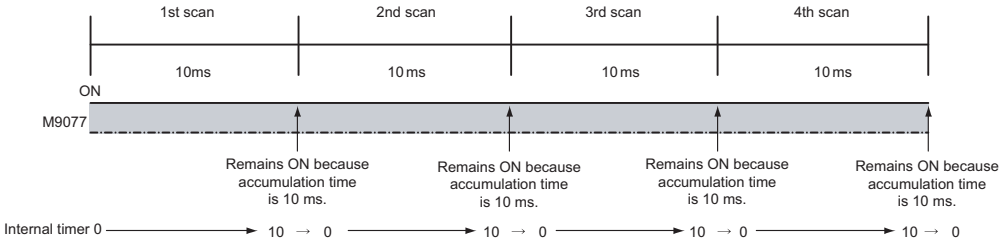
The operation of M9077 above is shown below:

(a) When 5ms is set at D9077 (The scan time is shorter than the setting value.)



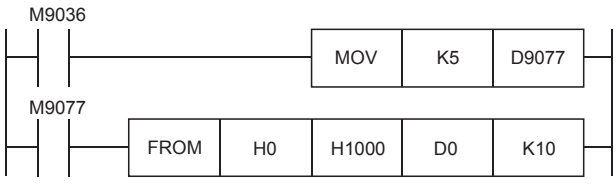
In the diagram above, M9077 is ON at the first scan so that the instruction is executed. At the beginning of the second scan, the accumulation time does not reach 5 ms. As a result, M9077 turns OFF, the accumulation time is cleared, and the instruction is not executed. At the end of the second scan, the accumulation time does not reach 5 ms, so that M9077 remains OFF and the instruction is not executed. At the end of the third scan, the accumulation time exceeds 5ms. As a result, M9077 turns ON, the accumulation time is cleared, and the instruction is executed at the forth scan. At the end of the forth scan, the accumulation time exceeds 5ms, so that M9077 remains ON and the instruction is executed at the fifth scan. At the end of the fifth scan, the accumulation time does not reach 5ms so that M9077 turns OFF. The accumulation time is cleared and the instruction is not executed at the sixth scan.

(b) When 5ms is set at D9077 (The scan time is longer than the setting value.)



In the diagram above, M9077 is always ON when the scan time is always longer than the setting value (D9077).

The following program example executes the FROM/TO instruction in the unit of several seconds using M9077 and D9077 above.



*1 The setting range for the sequence accumulation time is 1 to 255ms (default: 5ms). The value in D9077 should be in the range between 1 and 255. Otherwise, the value in D9077 is reset to 0 and M9077 is always OFF.

*2 If the instruction signal for the FROM/TO instruction is a pulse signal, the interlock with M9077 may mask the FROM/TO instruction, disabling execution. In such a case, keep the instruction signal once in the other device.

*3 If execution order is set to the FROM/TO instruction, adding M9077 may change the execution order. In such a case, do not use M9077, and make the execution interval of the FROM/TO instruction longer with a user program.

4.5 Handling Precautions

The following shows precautions when handling the CPU module from unpacking to installation.

⚠ CAUTION

- Use the programmable controller under the environment that meets the general specifications in this manual.
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount the CPU module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect mounting may cause malfunction, failure or a drop of the module.
  When using the programmable controller in an environment of frequent vibrations, fix the module with the screw.
  Tighten the screw within the specified torque range.
  Undertightening can cause drop of the screw, short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Insert securely the module fixing projection at the bottom of the AnS series module into the fixing hole in the base unit and then tighten the module fixing screw within the specified torque.
  When no screw is tightened, even if the module is installed correctly, it may cause malfunctions, a failure or a drop of the module.
  Tightening the screw excessively may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.
- When using an extension cable, connect it to the extension cable connector of the base unit securely.
  Check the connection for looseness.
  Poor contact may cause incorrect input or output.
- When using a memory card, fully insert it into the memory card slot.
  Check that it is inserted completely.
  Poor contact may cause malfunction.
- Shut off the external power supply for the system in all phases before mounting or removing the module.
  Failure to do so may result in damage to the product.
- Do not directly touch any conductive part or electronic components of the module.Doing so can cause malfunctions or a failure of the module.

(1) Do not drop or allow any impact to the modules case, memory card, terminal block connector, or pin connector.

(2) Do not remove the printed-circuit board from the module case. Doing so may cause a malfunction.

(3) Use caution to prevent foreign matter, such as wire chips, from entering the module during wiring.
If any foreign matter has entered the module, remove it.

(4) When using the expansion base module (QA1S6□B), be sure to install the power supply module.
Although modules with light load may operate without the power supply module, stable operation is not guaranteed.

(5) Tighten the module mounting screws and terminal block screws within the tightening torque range specified in the table below.

Screw	Tightening Torque Range
QCPU-A module fixing screw (M3 × 12)	36 to 48N ▪ cm
AnS series module mounting screw (M4)	78 to 118N ▪ cm
I/O module terminal block installation screw (M3.5)	59 to 88N ▪ cm
Power supply module terminal screw (M3.5)	59 to 88N ▪ cm

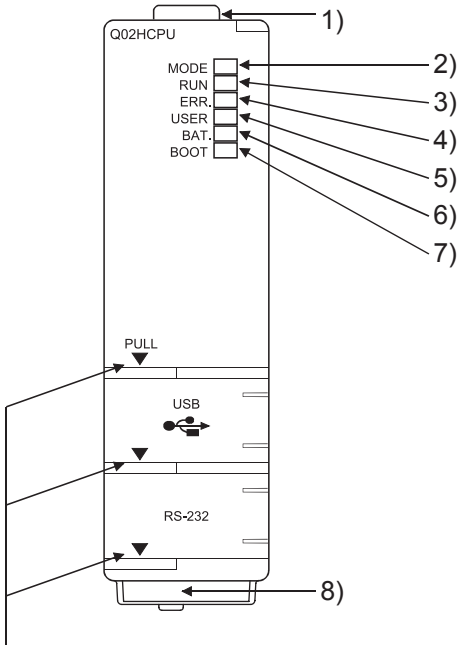
(6) When using the extension cable, do not install them together with the main circuit cables (high voltage, large current), or bring them close each other.

4.6 Part Names and Settings

The names of module parts and their settings of the QCPU-A are described here.

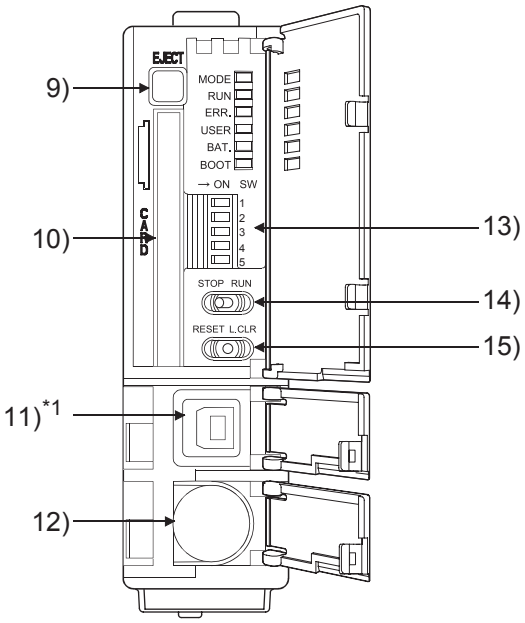
4.6.1 Part names

Front face



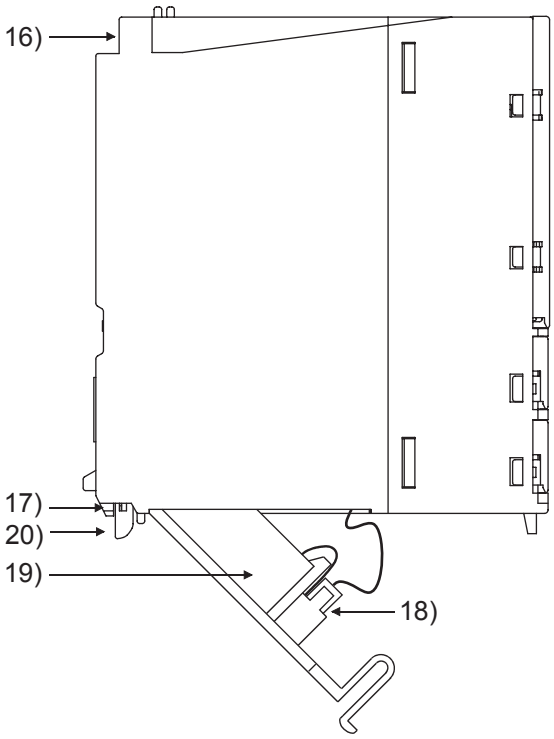
When opening the cover,
put your finger here.

With the front cover open

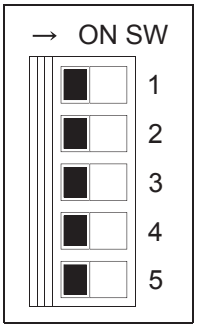


*1 Not provided for Q02CPU-A.

Side face



No.	Name	Description
1)	Module fixing hook	Hook for fixing the module to the base unit (Single-motion installation)
2)	MODE LED	Indicates the mode of the CPU. On (orange): A mode On (green): Q mode
3)	RUN LED	Indicates the operation status of the CPU. On: During operation in "RUN" or "STEP RUN" mode Off: During a stop in "STOP", "PAUSE" or "STEP RUN" mode, or an error that stops operation has occurred.
4)	ERR. LED	On: A self-diagnostics error that does not stop operation, other than a battery error, has been detected. (When the parameter setting is made for operation to continue when an error occurs.) Off: Normal Flicker: An error that stops operation has been detected.
5)	USER LED	On: Annunciator F is turned on. Off: Normal Flicker: Latch clear is performed.
6)	BAT. LED	On: A battery error has occurred due to low battery voltage of the CPU module and memory card. Off: Normal
7)	BOOT LED	On: Boot operation in execution Off: Boot operation not in operation
8)	Serial number	Shows the serial number printed on the rating plate.
9)	Memory card EJECT button	Used for ejecting the memory card from the CPU module.
10)	Memory card installing connector	Connector for installing the memory card in the CPU module
11)	USB connector	Unusable (Usable for Q mode only)
12)	RS-232 connector	Connector for connecting to a peripheral device Connectable with the RS-232C connection cable (QC30R2)

No.	Name	Description
13)	Dip switch 	Settings required to operate the CPU module are made.
		SW1: Use prohibited Always off (Set to off before shipping)
		SW2: Use prohibited Always off (Set to off before shipping)
		SW3: Boot operation from ROM (Set to off before shipping) ON: Boot operation from ROM OFF: RAM operation
		SW4: Use prohibited Always off (Set to off before shipping)
		SW5: Use prohibited Always off (Set to off before shipping)
14)	RUN/STOP switch	RUN: Executes sequence program operation. STOP: Stops sequence program operation.
15)	RESET/L.CLR switch	RESET: Resets the hardware. Resets and initializes operation when an operation error occurred. After performing a reset, return this switch to the neutral position. L.CLR: Clears all data in the latch area (to "OFF" or "0") which is set with parameters. Clears sampling trace and status latch registrations.
16)	Module fixing screw hole	Hole for fixing the screw to the base unit (M3 × 12 screw)
17)	Module installation lever	Lever for fixing the module to the base unit
18)	Battery connector pin	Used for connection of the battery lead wire. (To prevent battery drain, the battery lead wire is disconnected from the connector before shipment.)
19)	Battery	Backup battery for using the power failure compensation function for the built-in RAM and devices
20)	Module installation lever	Used to install the CPU module to the base unit.

4.6.2 Switch operation after program write

This section describes switch operations after program write.

(1) Writing programs with the CPU module in STOP state
When writing a program in the CPU module in the STOP status, follow the procedure below.

(a) RUN/STOP switch: STOP
RUN LED: Off.....CPU STOP status → Program write
(b) RUN/STOP switch: STOP → RUN
RUN LED: On.....CPU RUN status

(2) Writing programs during RUN
When writing a program during RUN of the CPU module, do not operate the switches.

4.6.3 Latch clear operation

(1) Latch clear operation procedure
To perform latch clear, operate the RESET/L.CLR switch as follows.

(a) RESET/L.CLR switch: Turn the switch to L.CLR several times until the USER LED flickers.
(Do not turn it to RESET.)
USER LED: Flicker.....Ready for latch clear
(b) RESET/L.CLR switch: Turn the switch to L.CLR once again.
USER LED: Off.....Latch clear completed

4.6.4 Handling of the memory card at power-on

Do not install or remove the memory card while the power is on.
If installing or removing the memory card at power-on, the data within the memory card may be corrupted.

POINT

The write protect information of the memory card can be recognized by the CPU module when the programmable controller is powered on or when a CPU module is reset. Note the following.

- When the power supply is turned on with the memory card write protect switch on, the program cannot be written even when the memory card write protect switch is turned off to modify the program. To modify the program, turn off the power supply or reset the CPU module.
- When the power supply is turned off with the memory card write protect switch set to off, the write protect will not function even when the memory card write protect switch is turned on to protect the program. To enable write protection, turn off the power supply or reset the CPU module.

5 POWER SUPPLY MODULE

5.1 Specifications

Specifications of power supply modules are shown below.

Table 5.1 Power supply module specifications

Item		Performance specifications		
		A1S61PN	A1S62PN	A1S63P
Base mounting position		Power supply module installing slot		
Input power supply		100 to 240VAC $^{+10\%}_{-15\%}$ (85 to 264VAC)		24VDC $^{+30\%}_{-35\%}$ (15.6 to 31.2VDC)
Input frequency		50/60Hz±5%		–
Input voltage distortion		Within 5% (See Section 9.6)		–
Max. input apparent power		105VA		41W
Inrush current		20A 8ms or lower*4		81A 1ms or lower
Rated output current	5VDC	5A	3A	5A
	24VDC	–	0.6A	–
Overcurrent protection*1	5VDC	5.5A or higher	3.3A or higher	5.5A or higher
	24VDC	–	0.66A or higher	–
Overvoltage protection*2	5VDC	5.5 to 6.5V		
	24VDC	–		
Efficiency		65% or higher		
Allowable momentary power failure period*3		20ms or lower		1ms or lower (24VDC or higher)
Dielectric withstand voltage	Between primary and 5VDC	AC across input/LG and output/FG, 2,830VAC rms/3 cycle (elevation 2,000m (6562ft.))		500VAC
	Between primary and 24VDC			–
Insulation resistance		AC across input/LG and output/FG 10MΩ or higher, measures with a 500VDC insulation resistance tester		
Noise durability		• Noise voltage 1,500 Vp-p, Noise width 1 μs, Noise frequency 25 to 60Hz (noise simulator condition) • Noise voltage IEC 801-4, 2kV		Noise voltage 500Vp-p, Noise width 1 μs, Noise frequency 25 to 60 Hz (noise simulator condition)
Operation indication		LED indication (On for 5VCDC output)		
Fuse		Built in (User cannot change.)		
Terminal screw size		M3.5×7		
Applicable wire size		0.75 to 2mm^2		
Applicable solderless terminal		RAV1.25 to 3.5, RAV2 to 3.5		
Applicable tightening torque		59 to 88N・cm		

Item	Performance specifications		
	A1S61PN	A1S62PN	A1S63P
External dimensions	130mm (5.12inch) × 55mm (2.17inch) × 93.6mm (3.69inch)		
Weight	0.60kg	0.60kg	0.50kg

POINT

*1 Overcurrent protection

The overcurrent protection device shuts off the 5VDC and/or 24VDC circuit(s) and stops the system if the current exceeding the specified value flows in the circuit(s).
As this results in voltage drop, the power supply module LED turns off or is dimly on.
After that, eliminate the causes of overcurrent, e.g., insufficient current capacity and short-circuit, and then start the system.
When the current value has reached the normal value, the initial start-up of the system will be performed.

*2 Overvoltage protection

The overvoltage protection shuts off the 5VDC circuit and stops the system if the overvoltage of 5.5 to 6.5V is applied to the circuit.
This results in the power supply module LED turning off.
When restarting the system, power off and on the input power supply, and the initial start-up of the system will be performed. If the system is not booted and the LED remains off, this means that the power supply module has to be replaced.

*3 Allowable momentary power failure period

The allowable momentary power failure period of programmable controller CPUs varies depending on the power supply module used.
In case of the A1S63P power supply module, the allowable momentary power failure period is defined as the time from when the primary side of the stabilized power supply for supplying 24VDC to the A1S63P is turned off until when the voltage (secondary side) has dropped from 24VDC to the specified voltage (15.6VDC) or less.

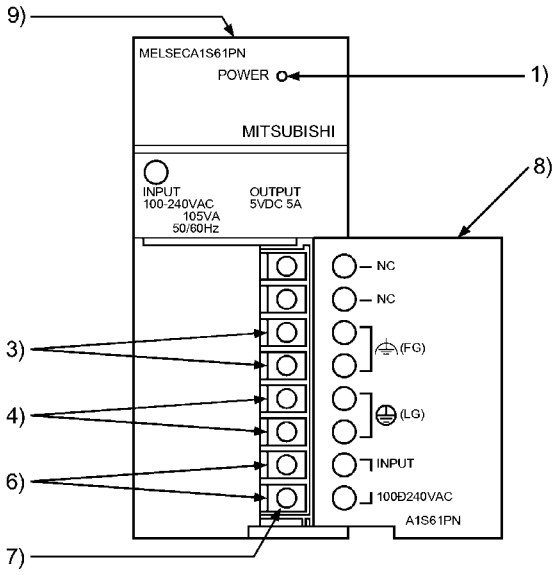
*4 Inrush current

If the power supply module is re-powered on right after powered off (within 5seconds), the inrush current exceeding the specified value (2ms or less) may be generated. Therefore, make sure to re-power on the module 5seconds after power off.
When selecting a fuse or breaker for external circuit, consider the above point as well as blown and detection characteristics.

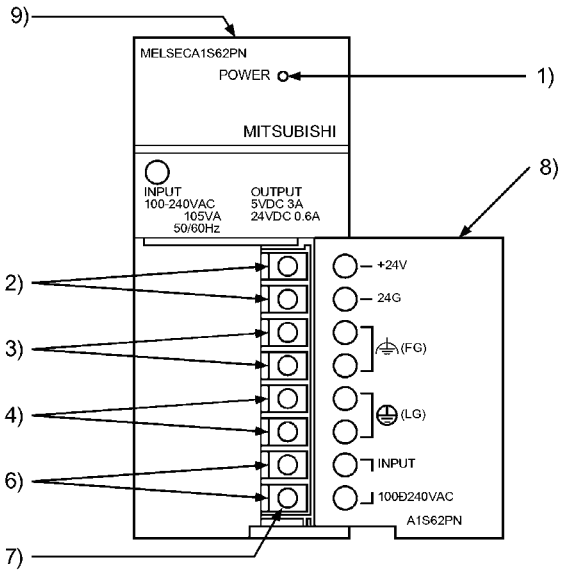
5.2 Part Names

Part names of the power supply modules are shown here.

(1) A1S61PN

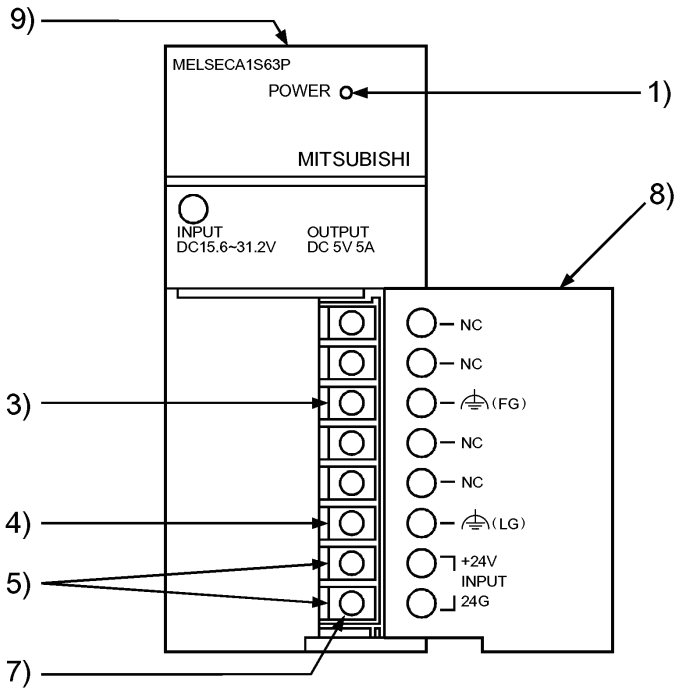


(2) A1S62PN



No.	Name	Description
1)	POWER LED	LED for the 5VDC power indicator.
2)	24VDC, 24GDC terminal	Used to supply 24VDC power supply to inside the output module (using external wiring).
3)	FG terminal	The ground terminal connected to the shielding pattern of the printed-circuit board.
4)	LG terminal	Grounding for the power supply filter. The potential of A1S61PN or A1S62PN terminal is 1/2 of the input voltage.

(3) A1S63P



No.	Name	Description
5)	Power input terminal	Used to connect a 24VDC power supply.
6)	Power input terminal	Used to connect 100VAC to 240VAC power supply.
7)	Terminal screw	M3.5×7
8)	Terminal cover	A protective cover for the terminal block.
9)	Module mounting screw	Used to fix a module to the base unit. (M4 screw; tightening torque: 59 to 88N ▪ cm)

POINT

(1) Do not cable to the unused terminals such as FG and LG on the terminal block (terminals whose name is not printed on the terminal cover).
(2) The protective ground terminal LG must be grounded.

6 BASE UNIT AND EXTENSION CABLE

6.1 Specifications

This section explains the specifications of the base units (the main and extension base units) and extension cables available for the systems, and the applicable standards for use of the extension base units.

6.1.1 Base unit specifications

(1) Main base unit specifications

Table 6.1 Main base unit

Item	QA1S33B	QA1S35B	QA1S38B
Allowable number of I/O modules to be mounted	3	5	8
Extension possibility	Extendable		
Applicable module	QCPU-A/AnS series module		
Current consumption	0.107A	0.117A (0.086A)*	0.118A (0.086A)*
Installation hole size	M5 screw hole or ϕ5.5 hole (for M5 screws)		
External dimensions	255(W)mm (10.04inch) × 130(H)mm (5.12inch) × 51.2(D)mm (2.02inch)	325(W)mm (12.80inch) × 130(H)mm (5.12inch) × 51.2(D)mm (2.02inch)	430(W)mm (16.93inch) × 130(H)mm (5.12inch) × 51.2(D)mm (2.02inch)
Weight	0.57kg	0.75kg	1.00kg
Accessory	Installation screw: M5 × 25 (4), connector cover (for dust proof)		

* The parenthesized values are for those products not provided with the CE mark.

(2) Extension base unit specifications

Table 6.2 Extension base unit

Item	QA1S65B	QA1S68B
Allowable number of I/O modules to be mounted	5	8
Extension possibility	Extendable	
Applicable module	AnS series module	
Current consumption	0.117A(0.088A)*	0.118A(0.090A)*
Installation hole size	M5 screw hole or ϕ5.5 hole (for M5 screws)	
External dimensions	315(W)mm (12.40inch) × 130(H)mm (5.12inch) × 51.2(D)mm (2.02inch)	420(W)mm (16.54inch) × 130(H)mm (5.12inch) × 51.2(D)mm (2.02inch)
Weight	0.75kg	1.00kg
Accessory	Installation screw: M5 × 25 (4), connector cover (for dust proof)	

* The parenthesized values are for those products not provided with the CE mark.

6.1.2 Extension cables specifications

The specifications of the extension cables used for the QCPU-A system are shown below:

Table 6.3 Extension cable specifications

Item	Type name				
	QC06B	QC12B	QC30B	QC50B	QC100B
Cable length	0.6m (1.97ft.)	1.2m (3.94ft.)	3.0m (9.84ft.)	5.0m (16.40ft.)	10.0m (32.81ft.)
Application	Connection between the main base unit and extension base unit, or between the extension units				
Weight	0.16kg	0.22kg	0.40kg	0.60kg	1.11kg

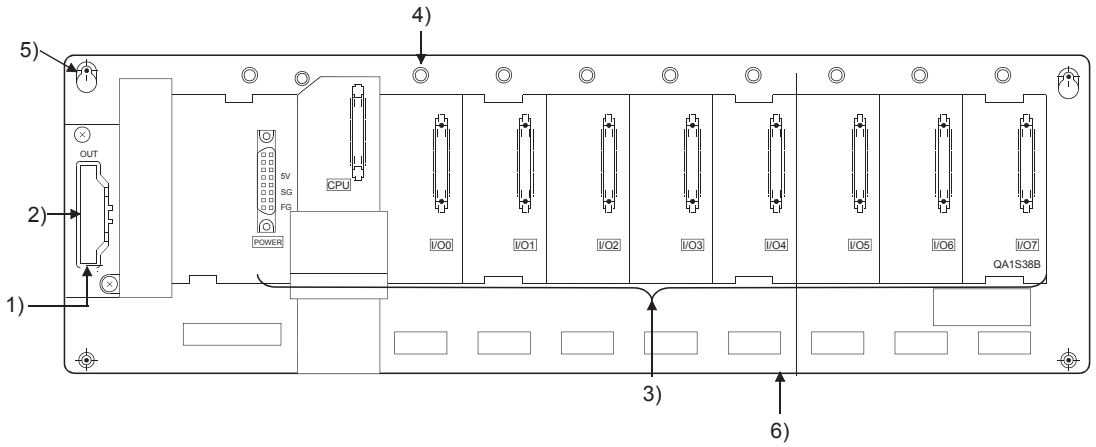
POINT

When using two or more extension cables, limit the total length of the cables to 13.2m (43.30ft.) or less.

6.2 Part Names and Settings

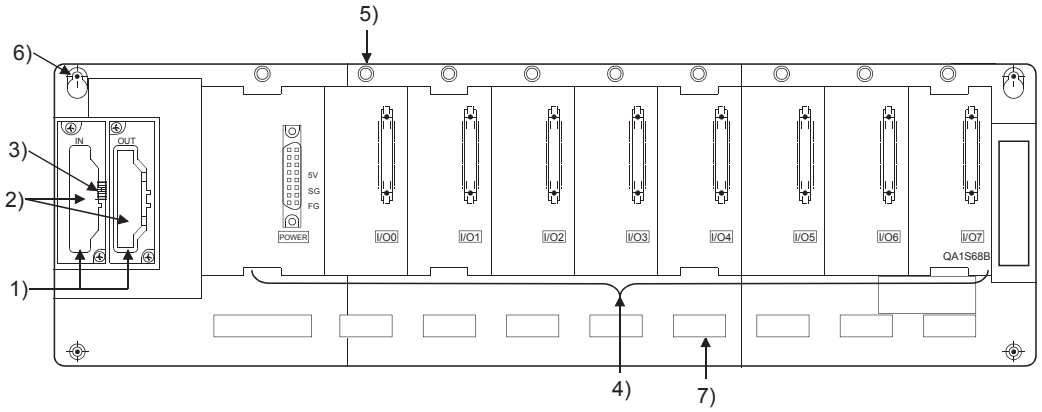
Part names of the base unit are shown below.

(1) Main base unit (QA1S33B, QA1S35B, QA1S38B)



No.	Name	Description
1)	Extension cable connector	A connector used to connect an extension cable, by which signals can be transmitted to/from an extension base unit.
2)	Base cover	A protective cover for the connector for the extension cable. To extend, the area surrounded by the groove below the OUT sign on the base cover has to be removed using a tool such as a nipper.
3)	Module connector	Connectors used to install the power supply module, CPU modules, I/O modules, and/or special function modules. To prevent dust from entering, attach the supplied connector cover or a blank cover (A1SG60) to the connector with no module installed.
4)	Module mounting screw hole	Screw hole to fix a module to the base. Screw size for CPU module: M3 × 12 Screw size for other than CPU module: M4 × 12
5)	Base installation hole	A bell-shaped hole used to install the base unit to a control panel. (For M5 screws)
6)	Hook for DIN rail	Hook for DIN rail installation. QA1S33B ..... 1 pc QA1S35B, QA1S38B ..... 2 pcs

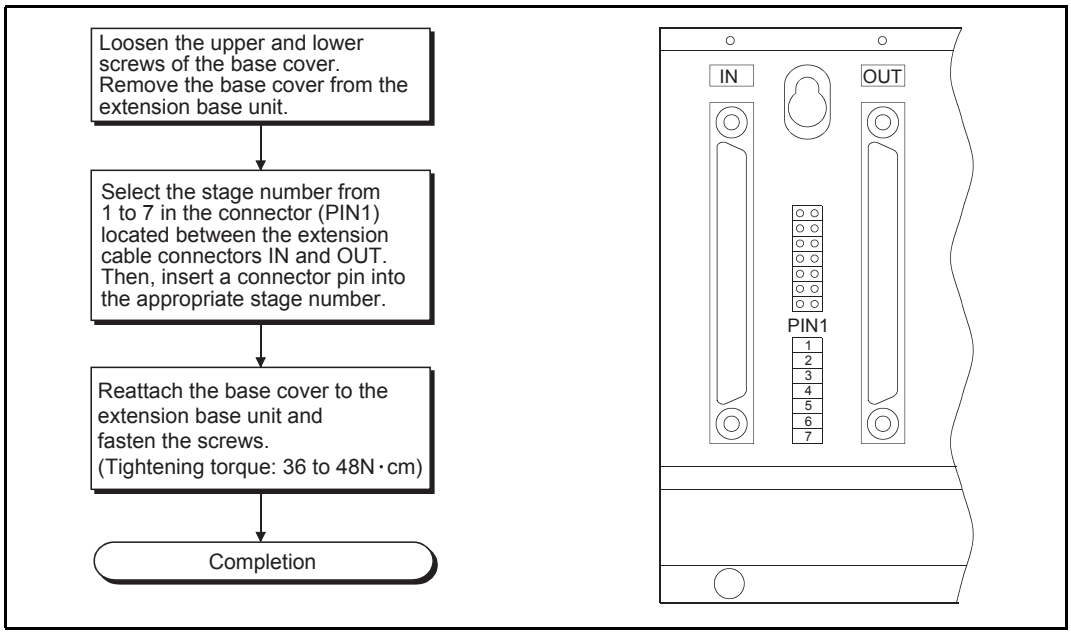
(2) Extension base unit (QA1S65B, QA1S68B)



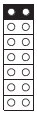
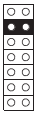
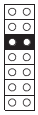
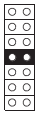
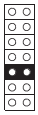
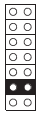
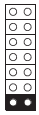
No.	Name	Description
1)	Extension cable connector	A connector used to connect an extension cable, by which signals can be transmitted to/from the main base unit or another extension base unit. Do not remove the supplied connector cover.
2)	Base cover	A protective cover for the connector for the extension cable.
3)	Stage number setting switch	Switch used to set the stage numbers of the extension base unit. Refer to Section 6.3 for the setting procedure.
4)	Module connector	Connectors used to install the power supply module, I/O modules, and/or special function modules. To prevent dust from entering, attach the supplied connector cover or a blank cover (A1SG60) to the connector with no module installed.
5)	Module mounting screw hole	Screw hole to fix a module to the base. For M4 screws.
6)	Base installation hole	A bell-shaped hole used to install the base unit to a control panel. (For M5 screws)
7)	Hook for DIN rail	Hook for DIN rail installation. QA1S65B, QA1S68B ..... 2 pcs

6.3 Setting the Extension Stage Numbers

This section describes how to set the extension stage number for each of the extension base units used.


Loosen the upper and lower screws of the base cover. Remove the base cover from the extension base unit.
Select the stage number from 1 to 7 in the connector (PIN1) located between the extension cable connectors IN and OUT. Then, insert a connector pin into the appropriate stage number.
Reattach the base cover to the extension base unit and fasten the screws. (Tightening torque: 36 to 48N·cm)
Completion
IN
OUT
PIN1
1
2
3
4
5
6
7

Stage number setting for extension base units

	Extension stage number setting						
	1st stage	2nd stage	3rd stage	4th stage	5th stage	6th stage	7th stage
Setting of the stage number setting connector							

POINT
(1) With the stage number setting connector, select one of the 1st to 7th that matches to the extension stage number in ascending order. (2) Do not assign the same stage number to several modules or skip any stage numbers. Otherwise, improper I/O operation results.

7 MEMORY CARD AND BATTERY

This chapter explains the specifications and handling of the memory card and the battery that are applicable for QCPU-A.

7.1 Memory Card

7.1.1 Specifications

The memory card applicable for QCPU-A conforms to the specifications of JEIDA/ PCMCIA small PC card.
Only one memory card can be installed to the QCPU-A.

(1) SRAM card

Item	Model
	Q2MEM-1MBS
Memory capacity after formatting	1011.5k bytes
Number of storable files	256
Number of insertion/removal times	5000 times
External dimensions	42.8(W)mm (1.69inch) × 45(H)mm (1.77inch) × 3.3(D)mm (0.13inch)
Weight	15g

7.2 Battery Specifications (CPU Module and Memory Card Batteries)

> ⚠ WARNING ● Correctly connect the battery connector.
> Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire.
> Doing so will cause the battery to produce heat, explode, or ignite, resulting in injury and fire.

7.2.1 Specifications

(1) CPU module batteries

Item	Model
	Q6BAT
Type	Manganese dioxide lithium primary battery
Initial voltage	3.0V
Nominal current	1800mAh
Battery life when stored	Actually 5 years (at ordinary temperature)
Battery life when used	Refer to Section 7.7.1.
Lithium content	0.49g
Application	Power failure compensation for the built-in RAM

REMARK

For the battery directive in EU member states, refer to Appendix7.

(2) Memory card batteries

Item	Model
	Q2MEM-BAT
Type	Graphite fluoride lithium primary battery
Initial voltage	3.0V
Nominal current	48mAh
Battery life when stored	Actually 5 years (at ordinary temperature)
Battery life when used	Refer to Section 7.7.1.
Lithium content	0.014g
Application	Power failure compensation for the SRAM card

7.2.2 Handling precautions

The following describes the battery handling precautions.

(1) Do not short it.
(2) Do not disassemble it.
(3) Do not put it in a fire.
(4) Do not heat it.
(5) Do not solder to the electrodes.

7.3 Handling Memory Cards

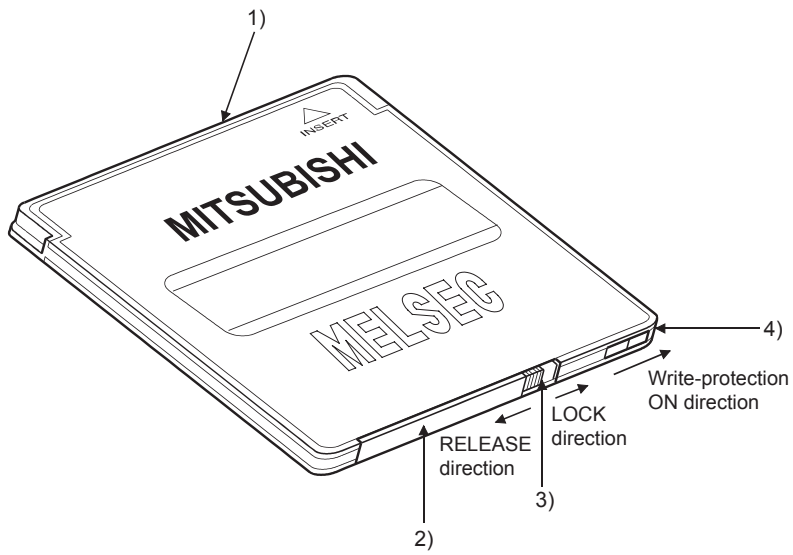
(1) Installing the battery into the SRAM card

The battery for power failure compensation is packaged with your SRAM card.
Be sure to install the battery into the SRAM card before using the card.

POINT
The memory of the SRAM card will not be backed up if the battery is not installed in the card even when a battery is installed in the CPU module. Also, if a battery is installed in the SRAM card but not in the CPU module, the memory of the built-in RAM of the CPU module will not be backed up.

7.4 Part Names of Memory Card

Part names of the memory card are shown below.



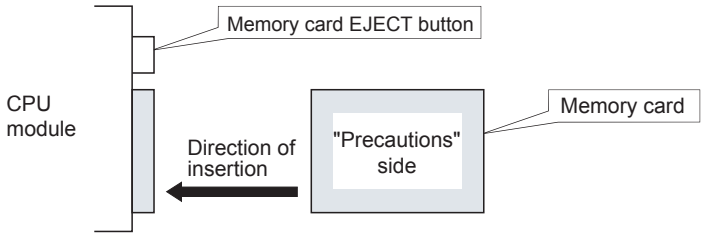
No.	Name	Description
1)	Connector	Connects the memory card to the CPU module.
2)	Battery holder	Holds a lithium battery that is used to backup SRAM data.
3)	Battery holder locking switch*	Locks the battery holder to the memory card. Fastens the battery holder at the LOCK position (write protect switch side). LOCK: Fastens the holder. RELEASE: Releases the holder.
4)	Write protect switch	Used to set write protection for the memory. Factory-set to off. ON: Data writing disabled OFF: Data writing enabled

* The battery holder locking switch automatically returns from the RELEASE to LOCK position when the battery holder is removed.

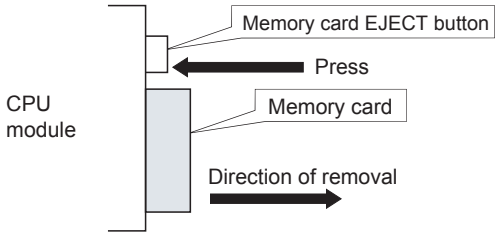
7.5 Installing/Removing a Memory Card

Be sure to turn off the CPU module before installing/removing the memory card into/from the CPU module.

(1) Installing a memory card
When installing a memory card into the CPU module, make sure that the orientation of the memory card is correct, then insert it fully until its edge is flush with the face of the EJECT button.



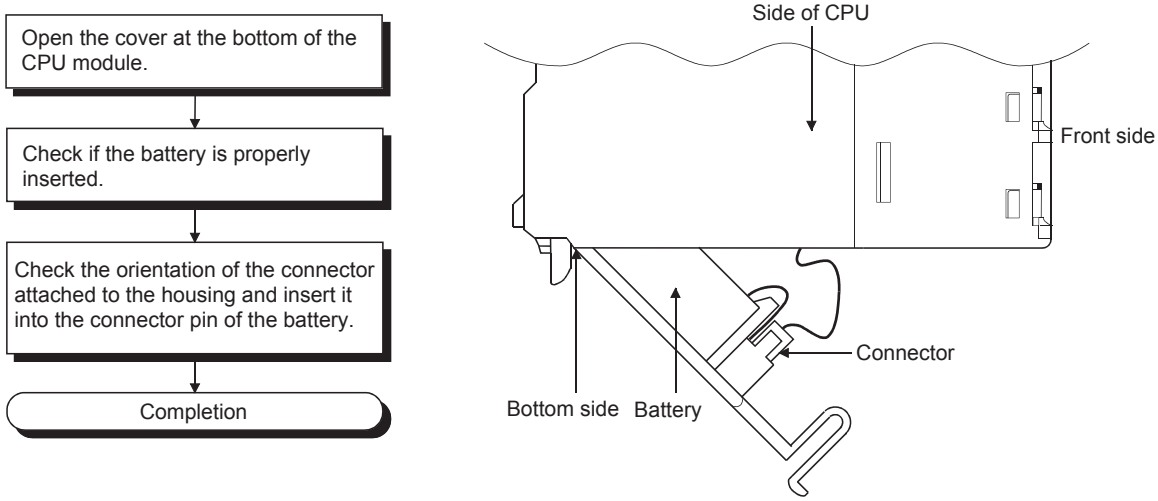
(2) Removing the memory card
To remove the memory card from the CPU module, press the memory card EJECT button to push out the memory card.



POINT
Note that the data in the memory card may be corrupted if the proper procedure above is not followed.

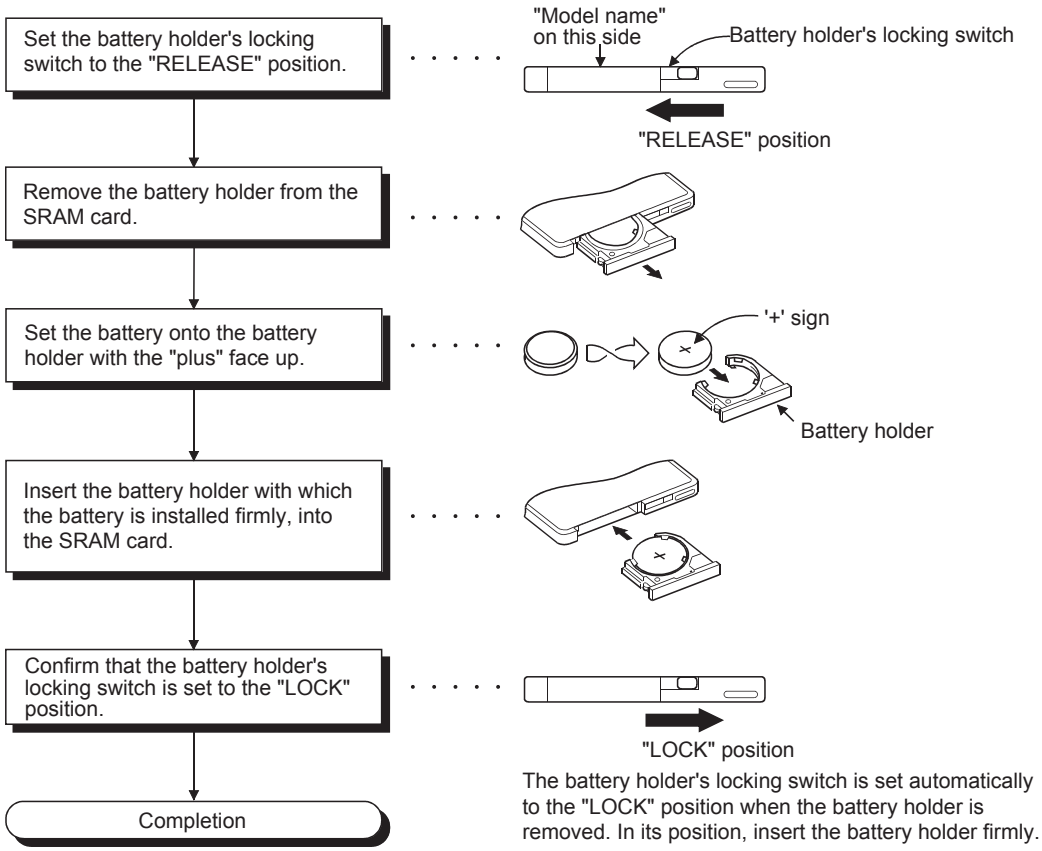
7.6 Installing Batteries (CPU Module and Memory Card Batteries)

(1) Since the CPU module battery is shipped with its battery connector disconnected, connect the connector according to the procedure indicated below.


Open the cover at the bottom of the CPU module.
Check if the battery is properly inserted.
Check the orientation of the connector attached to the housing and insert it into the connector pin of the battery.
Completion
Side of CPU
Front side
Connector
Bottom side
Battery

POINT
Firmly push the connector all the way.

(2) The battery for the SRAM card is shipped separately from the battery holder. To use the SRAM memory, set the battery holder according to the procedure below.


Set the battery holder's locking switch to the "RELEASE" position.
Remove the battery holder from the SRAM card.
Set the battery onto the battery holder with the "plus" face up.
Insert the battery holder with which the battery is installed firmly, into the SRAM card.
Confirm that the battery holder's locking switch is set to the "LOCK" position.
Completion
"Model name" on this side
Battery holder's locking switch
"RELEASE" position
'+' sign
Battery holder
"LOCK" position
The battery holder's locking switch is set automatically to the "LOCK" position when the battery holder is removed. In its position, insert the battery holder firmly.

7.7 Battery Replacement

Special relay M9006 or M9007 turns on when voltage of the battery for backing up programs and power failure compensation function drops. The program and power failure compensation data are not erased immediately when any of these special relays turns on, while these data may be erased if the on status of the special relay fails to be recognized. Replace the battery before the total of power failure compensation time after M9006 or M9007 turns on reaches the specified time.

POINT

M9006 is a battery voltage drop alarm and the data are retained within the specified time after M9006 turns on; however, the battery should be replaced as immediately as possible.

M9048 turns on at a voltage drop of the battery for a SRAM card.

POINT

The relationship of backup between the status of the batteries installed in CPU modules and SRAM cards is explained below.
The following two points are applied.
1) The battery in the CPU module does not back up the memory of the SRAM card.
2) The battery in the SRAM card does not back up the memory of the CPU module.

AC power supply to CPU module	Battery in CPU module	Battery in SRAM card	Memory of CPU module	Memory of SRAM card
ON	ON	ON	○	○
		OFF	○	○
	OFF	ON	○	○
		OFF	○	○
OFF	ON	ON	○	○
		OFF	○	×
	OFF	ON	×	○
		OFF	×	×

○ : Backup is possible. × : Backup is not possible.

The reference battery life and replacement procedures are described on the following pages.

7.7.1 Battery life

(1) Battery life of CPU module

The CPU module battery life differs depending on the CPU model.
The battery life for each CPU is shown below:

CPU model name	Battery life [hr]		
	Guaranteed value (MIN)	Actual value (TYP)	After M9006 turns on
Q02CPU-A	50625	79024	120
Q02HCPU-A, Q06HCPU-A	2140	16200	120

* The actual value indicates an average value; it may be different depending on the ambient temperature.

POINT

(1) Use batteries within the time shown by the guaranteed value.
(2) If the battery may be used exceeding the time shown by the guaranteed battery life value, perform the ROM operation to protect the program in case that the battery dies at programmable controller power off, or back up the program and data within the specified time indicated in the above table after M9006 (battery low) turns on.

(2) Battery life of SRAM card

The battery life for the SRAM card is shown below:

Battery model name		Battery life [hr]		
		Guaranteed value (MIN)	Actual value (TYP)	After M9006 turns on
Q2MEM-BAT	At storage	690	6336	8
	At operation	11784	13872	8

* The actual value indicates an average value; it may be different depending on the ambient temperature.
The battery life at storage indicates the battery consumption time of the SRAM card when it is installed into a programmable controller CPU with the power off, or when the SRAM card is stored separately from a programmable controller CPU.
The battery life at operation is the battery consumption time of the SRAM card when it is installed into a programmable controller CPU with the power on.

POINT

Note that the SRAM card consumes the battery even when it is installed in a CPU module with the power on.

As a guide, the battery life of the SRAM card is guaranteed for approximately 1.1 years on the condition that it is installed in a CPU module and the module is powered on one hour a day.

The life of the Q6BAT is approximately 10 years when it is not installed in a CPU module or when it is installed in a CPU module with the power always on. The Q6BAT should be immediately replaced when it has been used exceeding the time shown by the guaranteed value and M9006 turns on.
Even when the Q6BAT has been used less time than the guaranteed value of the table above, it is recommended to replace the battery in the following years to ensure preventive maintenance.
1) Ten years for Q02CPU-A
2) Four to five years for Q02HCPU-A and Q06HCPU-A

Replace the battery for the SRAM card immediately after M9048 turns on.

7.7.2 Battery replacement procedure

(1) CPU module battery replacement procedure

Replace the battery of a CPU module by following the procedure below when the life of the battery is over.

Before removing the battery, keep the CPU module powered on for 10 minutes or more.

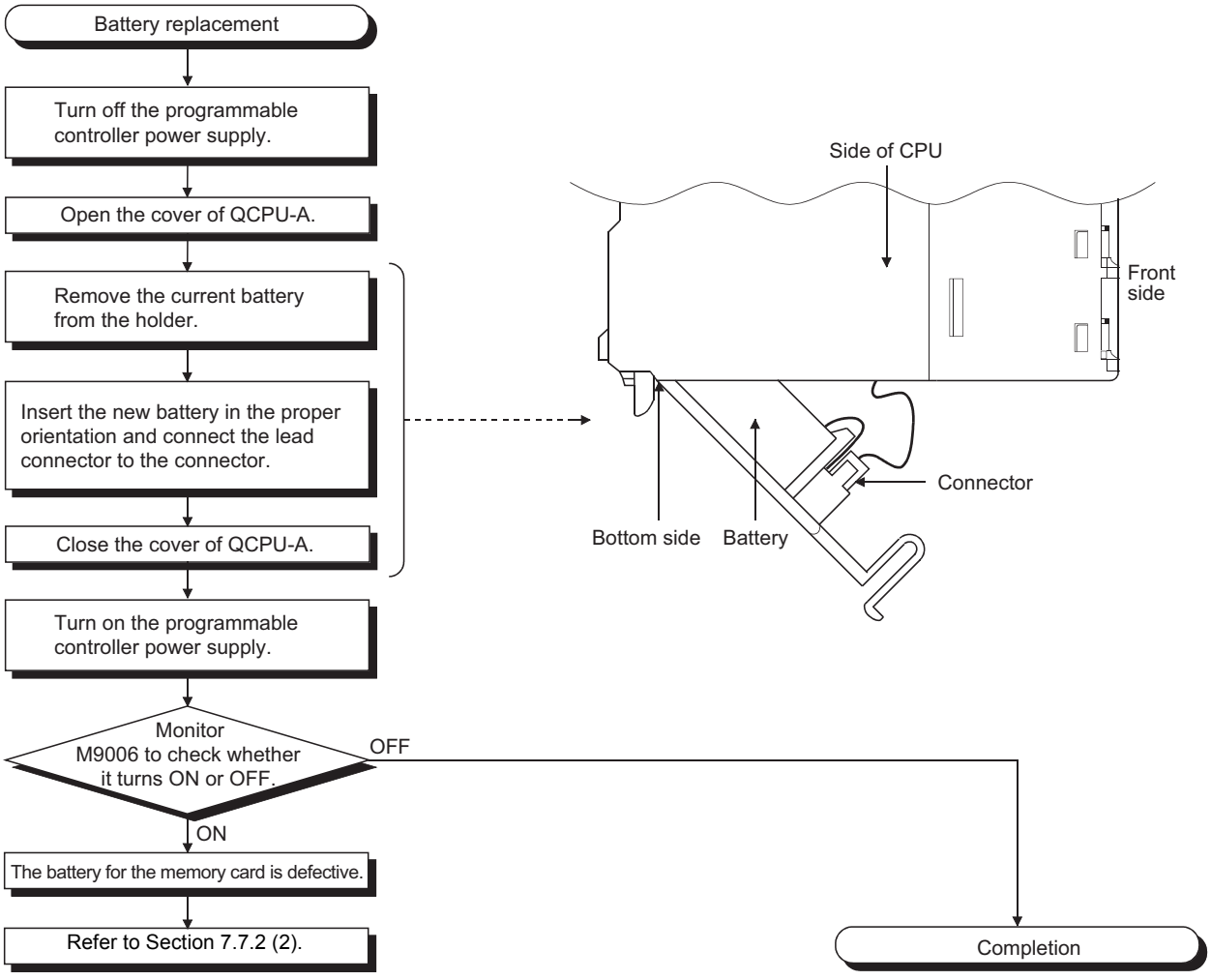
Even when the battery is removed, memory is backed up by the capacitor for a while. However, if replacement takes longer than the guaranteed value shown in the following table, the content of the memory may be erased, so replace the battery quickly.

Even if the programmable controller power is on, the battery of the CPU module can be replaced.

In this case, the memory contents are backed up by the power supply voltage from the power supply module.

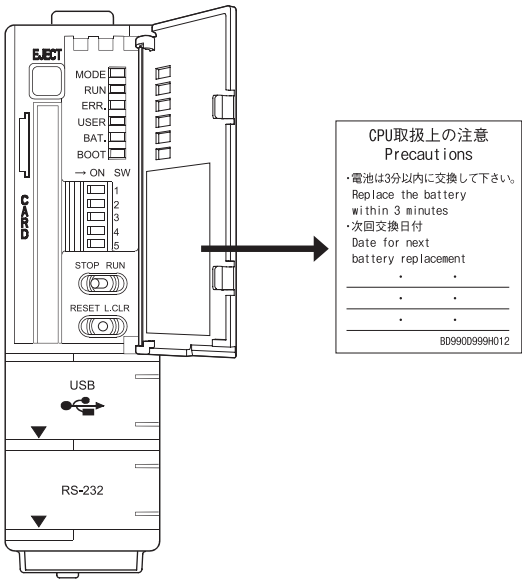
Backup time of the capacitor

Capacitor backup time [min.]
3


Battery replacement
Turn off the programmable controller power supply.
Open the cover of QCPU-A.
Remove the current battery from the holder.
Insert the new battery in the proper orientation and connect the lead connector to the connector.
Close the cover of QCPU-A.
Turn on the programmable controller power supply.
Monitor M9006 to check whether it turns ON or OFF.
OFF
ON
The battery for the memory card is defective.
Refer to Section 7.7.2 (2).
Completion
Side of CPU
Front side
Connector
Bottom side
Battery

POINT

After replacing a battery, write the date for next battery replacement on the sticker on the back side of the front cover.
Write the proper date by checking the battery life.



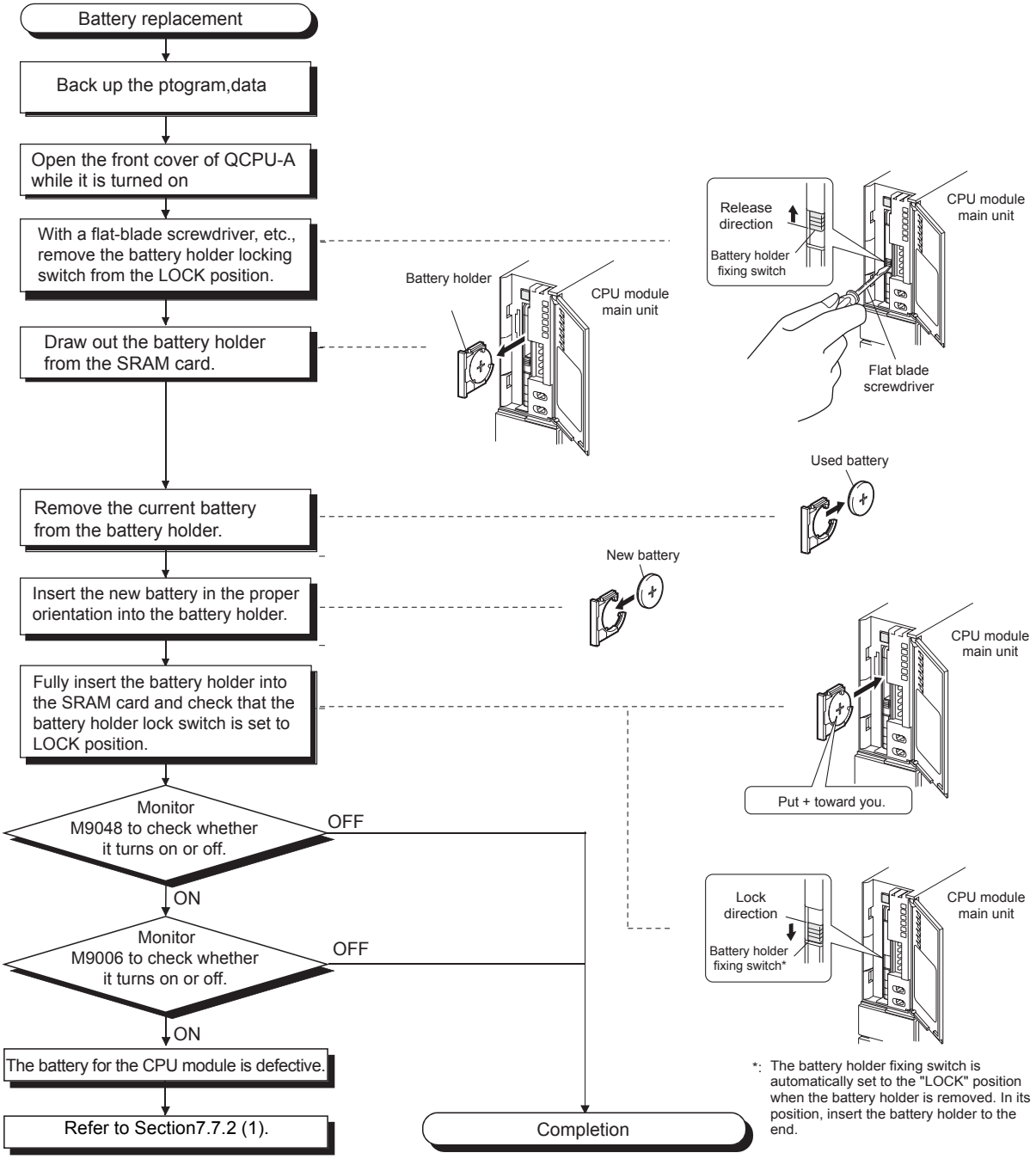
(2) SRAM card battery replacement procedure

Replace the battery of the SRAM card by following the procedure below when the life of the battery is over. The memory card does not have the secondary battery to back up the memory. To retain data, the battery should be replaced while the SRAM card is installed in the CPU module with the power on.

POINT

Note the following precautions before replacing a battery.

(a) To back up data, replace the SRAM card battery with the programmable controller power on and the SRAM card installed.
(b) Before replacement, back up the CPU module data using GX Developer.
(c) Since replacement is performed with the programmable controller power on, pay attention not to get an electric shock.
(d) When removing or installing the battery holder from/in the SRAM card, pay attention not to drop the battery out of the battery holder.
(e) When replacing a battery with the programmable controller power off, always back up the data before starting replacement.
[Battery replacement procedure]
1) Back up the SRAM card data using GX Developer.
2) Replace the battery.
3) Write the backed up data from the GX Developer to the memory card.


Battery replacement
Back up the ptogram,data
Open the front cover of QCPU-A while it is turned on
With a flat-blade screwdriver, etc., remove the battery holder locking switch from the LOCK position.
Draw out the battery holder from the SRAM card.
Remove the current battery from the battery holder.
Insert the new battery in the proper orientation into the battery holder.
Fully insert the battery holder into the SRAM card and check that the battery holder lock switch is set to LOCK position.
Monitor M9048 to check whether it turns on or off.
OFF
ON
Monitor M9006 to check whether it turns on or off.
OFF
ON
The battery for the CPU module is defective.
Refer to Section7.7.2 (1).
Completion
Battery holder
CPU module main unit
Release direction
Battery holder fixing switch
CPU module main unit
Flat blade screwdriver
Used battery
New battery
CPU module main unit
Put + toward you.
Lock direction
Battery holder fixing switch*
CPU module main unit
*: The battery holder fixing switch is automatically set to the "LOCK" position when the battery holder is removed. In its position, insert the battery holder to the end.

8 EMC AND LOW VOLTAGE DIRECTIVES

The products sold in the European countries have been required by law to comply with the EMC and Low Voltage Directives of the EU Directives since 1996 and 1997, respectively. The manufacturers must confirm by self-declaration that their products meet the requirements of these directives, and put the CE mark on the products.

(1) Authorized representative in Europe
Authorized representative in Europe is shown below.
Name :Mitsubishi Electric Europe BV
Address :Gothaer strase 8, 40880 Ratingen, Germany

8.1 Requirements for Compliance with EMC Directive

The EMC Directives specifies emission and immunity criteria and requires the products to meet both of them, i.e., not to emit excessive electromagnetic interference (emission): to be immune to electromagnetic interference outside (immunity). Guidelines for complying the machinery including MELSEC-Q series programmable controller with the EMC Directives are provided in Section 8.1.1 to Section 8.1.7 below.
The guidelines are created based on the requirements of the regulations and relevant standards, however, they do not guarantee that the machinery constructed according to them will comply with the Directives. Therefore, manufacturers must finally determine how to make it comply and how it is compliant with the EMC Directives.

8.1.1 EMC standards

Standards related to the EMC directives are described below.

Specifications	Test Item	Test Description	Standard Values
EN61000-6-4 (2001)	EN55011*2 Radiated noise	Measure the emission released by the product.	30 M-230 M Hz QP : 30dBμ/m (30m measurement) *1 230 M-1000 M Hz QP : 30dBμ/m (30m measurement) *1
	EN55011*2 Conduction noise	Measure the emission released by the product to the power line.	150 K-500k Hz QP: 79 dB, Mean : 66 dB *1 500 K-30M Hz QP : 73 dB, Mean: 60 dB*1
EN61131-2/A12 (2000)	EN61000-4-2*2 Static electricity immunity	Immunity test by applying static electricity to the module enclosure.	4kV contact discharge 8kV air discharge
	EN61000-4-4*2 First transient burst noise	Immunity test by applying burst noise to the power line and signal line.	2kV Power line 1kV Signal line
	EN61000-4-12*2 Damped oscillatory wave	Immunity test in which damped oscillatory waves are applied to power line.	1kV
	EN61000-4-3*2 Radiated electromagnetic field	Immunity test in which electric fields are applied to the product.	10V/m, 26-1000MHz
EN61000-6-2 (2001)	EN61000-4-6*2 Conduction noise	Immunity test in which electromagnetic fields are induced to power line and signal line.	10V, 0.15-80MHz

*1 QP: Quasi-peak value, Mean: Average value
*2 The programmable controller is an open type device (device installed to another device) and must be installed in a conductive control panel. The tests for the corresponding items were performed while the programmable controller was installed inside the control panel.

8.1.2 Installation inside the control panel

The programmable controller is open equipment and must be installed within a control panel for use.* This is effective not only for ensuring safety but also for shielding electromagnetic noise generated from the programmable controller.

* Each network remote station also needs to be installed inside the control panel. However, waterproof type remote stations can be installed outside the control panel.

(1) Control panel

(a) Use a conductive control panel.

(b) When fixing the top or base plate with bolts, mask the fixing area when painting so that an electrical contact can be made.

(c) To ensure an electrical contact with the control panel, mask the bolt areas of the inner plates when painting to allow conductivity over the widest possible area.

(d) Ground the control panel with a thick ground wire so that a low impedance can be ensured even at high frequencies.

(e) Holes made in the control panel must be 10cm (3.94inch) diameter or less. If the diameter is more than 10cm (3.94inch), radio waves can be leaked.
In addition, because radio waves leak through a clearance between the control panel door and the main module, reduce the clearance as much as possible.
The leakage of radio waves can be suppressed by the direct application of the EMI gasket on the paint surface.
We carries out the tests on the panel having the damping characteristics of 37dB max. and 30dB mean (measured by 3m method with 30 to 300MHz).

(2) Connection of power cable and ground wires
Handle the power cables and ground wires as described below.

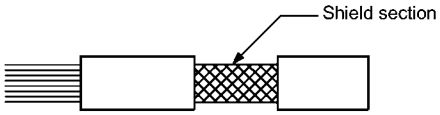
(a) Provide a grounding point near the power supply module. Ground the power supply module's LG and FG terminals (LG : Line Ground, FG : Frame Ground) with the thickest and shortest wire possible. (The wire length must be 30 cm (11.18inch) or shorter.) As the LG and FG terminals release the noise generated in the programmable controller to the ground, the lowest possible impedance must be ensured.
The ground wires also need to be short as they are used to release noise. Because the wire itself carries large noise, short wiring prevents it from acting as an antenna.

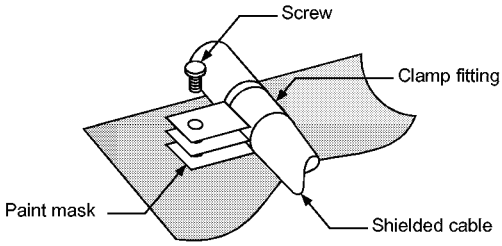
(b) Twist the ground wire led from the grounding point with the power cable. By doing this, noise from the power cable can be released to the ground. If a filter is attached to the power cable, however, this twisting may not be needed.

8.1.3 Cable

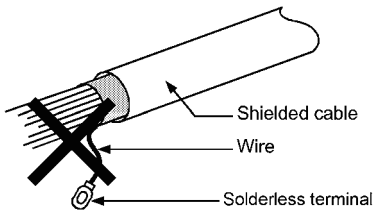
The cables running from the control panel contain a high frequency noise component, and outside the control panel, they release noise acting as antennas. Always use shielded cables when cables connected to I/O modules and/or special modules are to be brought out from the control panel.
Using shielded cables also increases noise durability. The signal lines (including common line) of the programmable controller, which are connected to I/O modules and/or special modules, have noise durability compliant with EN6113-2/A12(2000)in the condition that shielded cables are to be used. If shielded cables are not used, or if grounding of shielded cables is not correct, the noise durability will be less than the specified value.

(1) Grounding of shielded cables
   (a) Ground the shield of the shielded cable as near the module as possible so that the grounded cables are not induced electromagnetically by the cable to be grounded.
   (b) Partly remove the outer sheath of the shielded cable so that it can be contacted with the widest possible area of the control panel. A clamp may also be used as shown in the figure below. In this case, cover the control panel's inner surface which will come in contact with the clamp when painting.



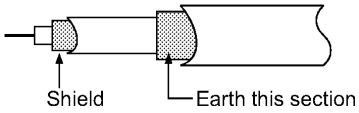


Note) Grounding a shield cable by soldering a wire to the shield section as illustrated below is not recommended. The high frequency impedance will increase and the shield will be ineffective.



(2) MELSECNET (II) and MELSECNET/10 modules

(a) Use a double-shielded coaxial cable (MITSUBISHI CABLE INDUSTRIES, LTD.: 5C-2V-CCY) for the MELSECNET modules (such as A1SJ71AR21, A1SJ71LR21, A1SJ71BR11) which uses coaxial cables. Radiated noise in the range of 30 MHz or higher can be suppressed by using double-shielded coaxial cables. Ground the double-shielded coaxial cable by connecting its outer shield to the ground.



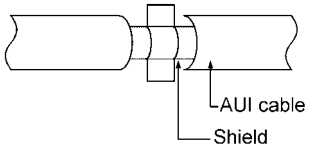
Refer to (1) for the grounding of the shield.

(b) Always attach a ferrite core to the double-shielded coaxial cable connected to the MELSECNET module. In addition, position the ferrite core on each cable near the outlet of the control panel. The ZCAT3035 ferrite core (TDK) is recommended.

(3) Ethernet module

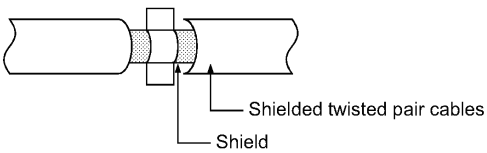
Precautions when using the AUI cables[*1], twisted pair cables, and coaxial cables are described below.

(a) Be sure to ground the AUI cables[*1] connected to the 10BASE5 connectors. Because the AUI cable is of the shielded type as shown in the figure below, partly remove the outer sheath, and ground the exposed shield section to the widest possible surface.



Refer to (1) for the grounding of the shield.

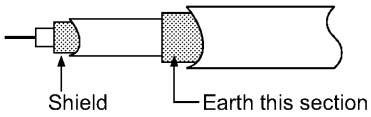
(b) Use shielded twisted pair cables as the twisted pair cables[*1] connected to the 10BASE-T connectors. Partly strip the outer sheath of the shielded twisted pair cable, and ground the exposed shield section to the widest possible area as shown below.



Refer to (1) for the grounding of the shield.

*1 Make sure to attach a ferrite core to the cable.
The ZCAT2032 ferrite core (TDK) is recommended.

(c) Always use double-shielded coaxial cables as the coaxial cables[*2] connected to the 10BASE2 connectors. Ground the double-shielded coaxial cable by connecting its outer shield to the ground.



Refer to (1) for the grounding of the shield.

*2 Make sure to attach a ferrite core to the cable.
The ZCAT3035 ferrite core (TDK) is recommended.

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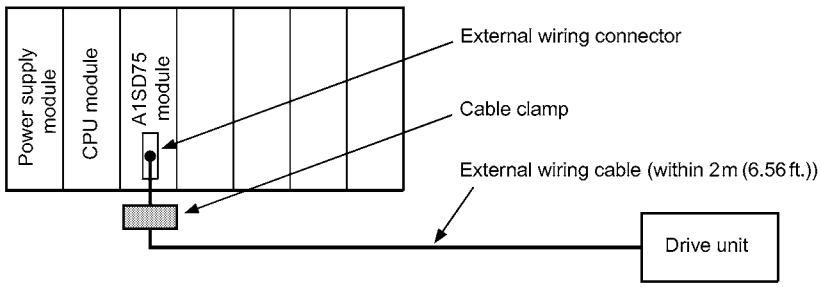
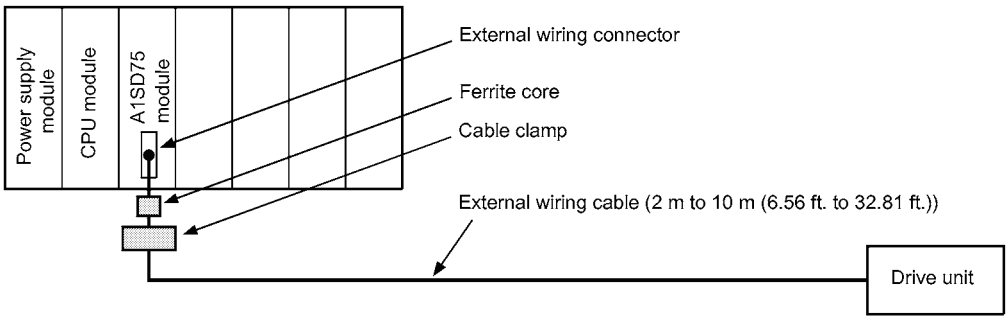
(4) I/O signal cables and other communication cables
Always ground the I/O signal lines (including common line) and other communication cables (RS-232, RS-422, etc.) in the same manner as described in (1) if they are brought out of the control panel.

(5) Positioning modules
Precautions for configuring machinery compliant with the EMC Directives using the A1SD75P□-S3 are described below.

(a) When using a cable of 2m (6.56ft.) or less
- Ground the shield section of the external wiring cable with a cable clamp. (Ground the shield at the closest location to the A1SD75-S3 external wiring connector.)
- Connect the external wiring cable to a drive unit or an external device in the shortest distance.
- Install the drive unit in the same panel.



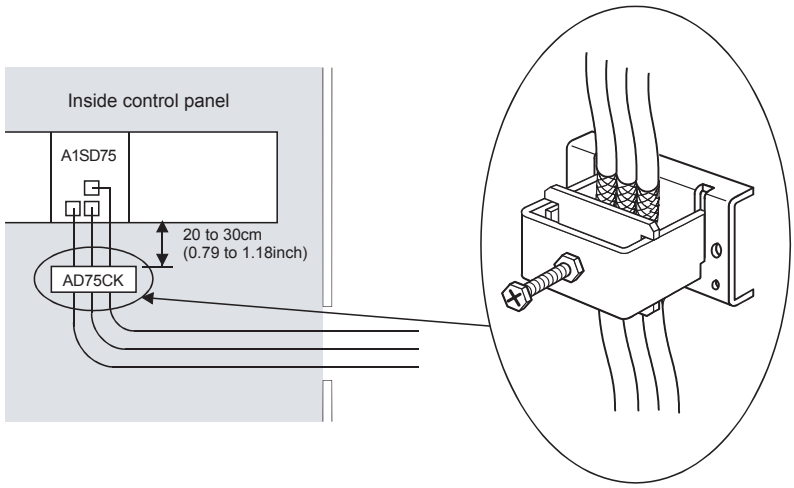
(b) When connecting a cable longer than 2m (6.56ft.), but not exceeding 10m (32.81ft.)
- Ground the shield section of the external wiring cable with a cable clamp. (Ground the shield at the closest location to the A1SD75-S3 external wiring connector.)
- Install a ferrite core.
- Connect the external wiring cable to a drive unit or an external device in the shortest distance.



(c) Models and required quantities of the ferrite core and cable clamp
- Cable clamp
  Model: AD75CK (Manufactured by Mitsubishi Electric)
- Ferrite core
  Model: ZCAT3035-1330 (TDK ferrite core)
  Contact: TDK Corporation
- Required quantity

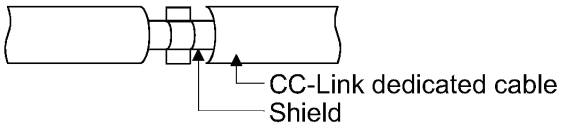
Cable Length	Optional Part	Required Quantity		
		1 axis	2 axes	3 axes
Within 2m (6.56ft.)	AD75CK	1	1	1
2m (6.6 ft.) to 10m (32.8 ft.)	AD75CK	1	1	1
	ZCAT3035-1330	1	2	3

(d) Cable clamp position



(6) CC-Link module

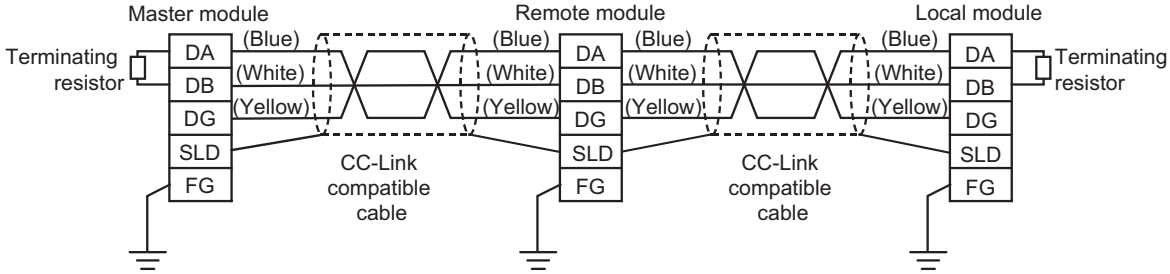
(a) Be sure to ground the cable shield that is connected to the CC-Link module close to the outlet of a control panel or to any of the CC-Link stations within 30cm (11.8inch) from the module or stations.
The CC-Link dedicated cables are shielded cables. As shown in the illustration below, remove a part of the outer sheath and ground it to the widest possible area.



(b) Always use the specified CC-Link dedicated cable.

(c) Connect the CC-Link module and each CC-Link station to the FG line inside the control panel with the FG terminals as shown below.

[Simplified diagram]



(d) Power line connecting to the external power supply terminal (compliant with I/O power port of CE standard) should be 30m (98.43 ft.) or less. Power line connecting to module power supply terminal (compliant with I/O power port of CE standard) should be 10m (32.81 ft.) or less.

(e) A power line connecting to the analog input of the following modules should be 30cm or less.
- AJ65BT-64RD3
- AJ65BT-64RD4
- AJ65BT-68TD

(7) Measures against static electricity
When using an insulation displacement connector without connector cover, a connected cable for the connector is thin in applicable wire size and coating. Therefore, note that the module may cause an electric discharge failure.
As measures against the failure, using pressure-displacement type connector whose applicable wire size is thick or soldering type connector is recommended.

8.1.4 Power supply module

The precautions required for each power supply module are described below. Always observe the items noted as precautions.

Model	Precautions
A1S61PN, A1S62PN	Make sure to short and ground the LG and FG terminals.*2
A1S63P *1	Use a CE-compliant 24VDC power supply in the control panel.

*1 Attaching a filter to the power cable is not necessary for the A1S63P version (F) or later. However, use a CE-compliant 24VDC power supply in the control panel.

*2 To ensure the compliance with the CE (EN6111-21/A11), make sure to short the LG and FG terminals using a wire of 6 to 7cm (2.36 to 2.76 inch).

8.1.5 Ferrite core

Use of ferrite cores is effective in reducing conduction noise in the band of about 10MHz and radiated noise of 30 to 100MHz.
It is recommended to attach ferrite cores when the shield of the shielded cable extracted from control panel does not work effectively, or when emission of the conduction noise from the power supply line has to be suppressed.*1 The ferrite cores used in our tests are TDK ZCAT3035.
Note that the ferrite cores should be fitted to the cables immediately before they are pulled out of the panel. If the fitting position is improper, the ferrite will not produce any effect.

*1 To comply with CE (EN61131-2/A12), make sure to attach 2 ferrite cores to the power supply line.
Approximate the mounting position to the power supply module as long as possible.
Use the following ferrite core.
- Ferrite core
  Model: ZCAT2235-1030A
  Contact: TDK Corporation

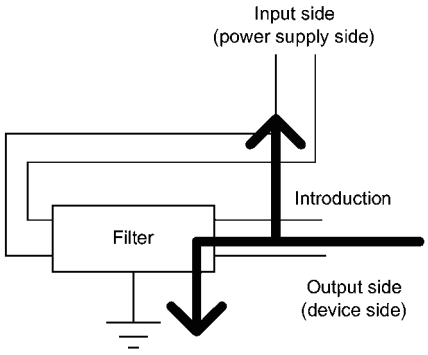
8.1.6 Noise filter (power supply line filter)

A noise filter is effective for suppressing conduction noise. It is not required to attach a noise filter to the power supply line except for some models, however, attaching it can suppress more noise. (The noise filter has the effect on reducing conduction noise of 10MHz or less.) Use any of the following noise filters (double π type filters) or equivalent.

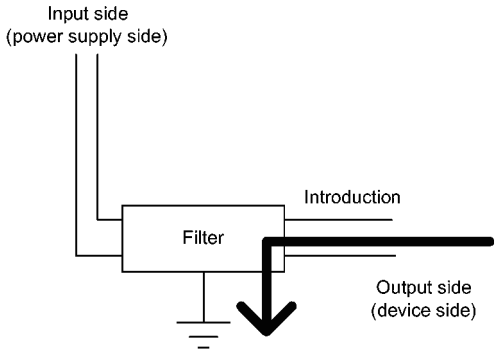
Model Name	FN343-3/01	FN660-6/06	ZHC2203-11
Manufacturer	SCHAFFNER	SCHAFFNER	TDK
Rated current	3A	6A	3A
Rated voltage	250V		

The precautions required when installing a noise filter are described below.

(1) Do not bundle the wires on the input side and output side of the noise filter together. When bundled, the output side noise will be induced into the input side wires from which noise has been filtered out.



(a) The noise is induced when the input and output wires are bundled together.



(b) Separate the input wires from the output wires.

(2) Ground the noise filter ground terminal to the control panel with the shortest wire possible (approx. 10cm (3.94inch)).

8.1.7 Power line for external power supply terminal

The power line connecting to the external power supply terminal of the module should be 30m (98.43 ft.) or less.

8.2 Requirements for Compliance with Low Voltage Directive

The Low Voltage Directives apply to the electrical equipment operating from 50 to 1000VAC or 75 to 1500VDC; the manufacturer must ensure the safety of the equipment. Sections 8.2.1 to Section 8.2.7 provide precautions on installation and wiring of the MELSEC-AnS series programmable controller to conform to The Low Voltage Directives. The descriptions are made based on the requirements and standards of the latest regulation. However, they do not guarantee that any machinery produced according to the contents of this manual is compliant with the above directives. Therefore, manufacturers must finally determine how to make it comply and how it is compliant with the low voltage directive.

8.2.1 Standard applied for MELSEC-AnS series programmable controller

The standard applied for MELSEC-AnS series programmable controller is EN61010-1: Safety of devices used in measurement, control, or laboratories.

For the modules which operate with the rated voltage of 50VAC/75VDC or above, we have developed new models that conform to the above standard.

For the modules which operate with the rated voltage less than 50VAC or 75VDC, conventional models can be used, because the low voltage directives do not apply to them.

8.2.2 Precautions when using the MELSEC-AnS series programmable controller

Module selection

(1) Power supply module
Since a power supply module with the rated input voltage of 100/200VAC has a potentially hazardous voltage area (42.4V or more at the peak), select a model in which reinforced insulation is provided between the primary and secondary sides.
For those of 24VDC rated input, conventional models can be used.

(2) I/O module
Since an I/O module with the rated input voltage of 100/200VAC has a potentially hazardous voltage area, select a model in which reinforced insulation is provided between the primary and secondary sides.
For those of 24VDC rated input, conventional models can be used.

(3) CPU module, memory card, base unit
Conventional models can be used for these modules, because they only have a 5VDC circuit inside.

(4) Special function module
Conventional models can be used for the special function modules including analog modules, network modules, and positioning modules, because their rated voltage is 24VDC or lower.

(5) Display
Use the CE-marked product.

8.2.3 Supply power

The insulation specification of the power supply module is designed assuming installation category II. Be sure to use the installation category II for supply power to the programmable controller.
The installation category indicates the durability level against surge voltage generated by thunderbolt. Category I has the lowest durability; and category IV has the highest durability.

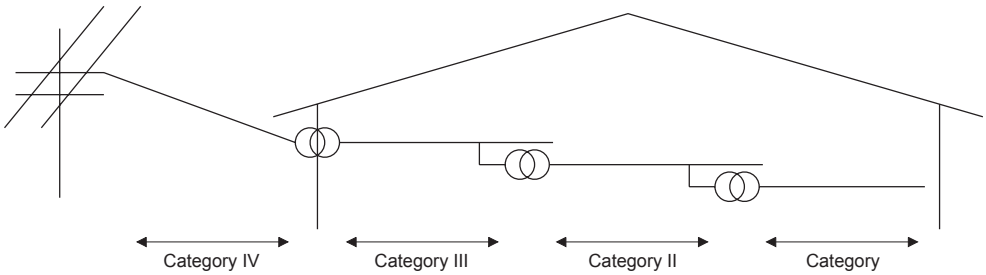


Fig.8.1 Installation category

Category II indicates a power supply whose voltage has been reduced by two or more levels of isolating transformers from the public power distribution network.

8.2.4 Control panel

Because the programmable controller is an open type device (a device designed to be stored within another device), be sure to use it inside the control panel.*

* Also, each network remote station needs to be installed inside the control panel. However, the waterproof type remote station can be installed outside the control panel.

(1) Shock protection

To prevent personnel such as operators who are not familiar with electricity from electric shocks, the control panel must be handled as follows:

(a) Lock the control panel so that only the qualified personnel can open it.

(b) Provide a mechanism so that opening the control panel will automatically stop the power supply.

(c) For electric shock protection, use IP20 or greater control panel.

(2) Dustproof and waterproof features

The control panel also has the dustproof and waterproof functions. Insufficient dustproof and waterproof features lower the insulation withstand voltage, resulting in insulation destruction. As our programmable controllers are designed assuming the pollution level 2, use them in an environment of pollution level 2 or lower.

Pollution level 1: An environment where the air is dry and conductive dust does not exist.

Pollution level 2: An environment where conductive dust does not usually exist, however, temporary conductivity may occasionally occur due to accumulated dust. Generally, this is the level for the inside of the IP54-equivalent control panel in a control room or on a shop floor.

Pollution level 3: An environment where conductive dust exists and conductivity may be generated due to the accumulated dust.
An environment for a typical factory floor.

Pollution level 4: Continuous conductivity may occur due to rain, snow, etc. An outdoor environment.

As shown above, the programmable controller can meet pollution level 2 when stored in a control panel equivalent to IP54.

8.2.5 Module installation

(1) Installing modules contiguously
The left side face of each AnS series I/O module is open. When installing I/O modules to the base, do not allow any empty slots between modules. If a slot to the left of a 100/200VAC module is left empty, the circuit board containing the hazardous voltage circuit is exposed. When a slot needs to be left open, be sure to install the blank module (A1SG60).

8.2.6 Ground

There are two kinds of ground terminals as shown below. Either ground terminal must be used grounded.
Be sure to perform protective grounding to ensure the safety.

Protective grounding ⏚ : Ensures the safety of the programmable controller and improves the noise resistance.
Functional grounding ⏚ : Improves the noise resistance.

8.2.7 External wiring

(1) Module power supply and external power supply
For the remote module which requires 24VDC as module power supply, the 5/12/24/48VDC I/O module, and the special function module which requires the external power supply, use the 5/12/24/48VDC circuit which is doubly insulated from the hazardous voltage circuit or use the power supply whose insulation is reinforced.

(2) External devices
When a device with a hazardous voltage circuit is externally connected to the programmable controller, use a model whose circuit section of the interface to the programmable controller is intensively insulated from the hazardous voltage circuit.

(3) Reinforced insulation
Reinforced insulation refers to the insulation with the dielectric withstand voltage shown in the following table.

Reinforced insulation withstand voltage (installation category II, source : IEC 664)

Rated voltage of hazardous voltage area	Surge withstand voltage (1.2/50 μs)
150VAC or less	2500V
300VAC or less	4000V

9 LOADING AND INSTALLATION

9.1 Module Installation

9.1.1 Handling precautions

This section explains some notes on handling the CPU module, I/O module, special function module, power supply module, and base unit.

(1) Do not drop or allow any impact to the module case, memory card, terminal block connector, and pin connector.

(2) Do not remove the printed-circuit board from the module case.
Doing so may cause a malfunction.

(3) Use caution to prevent foreign matter, such as wire chips, from entering the module during wiring.
If any foreign matter has entered the module, remove it.

(4) When using the extension base unit QA1S6□B, be sure to install the power supply module.
Although modules with light load may operate without the power supply module, stable operation is not guaranteed.

(5) Tighten the module mounting screws and terminal block screws within the tightening torque range specified in the table below.

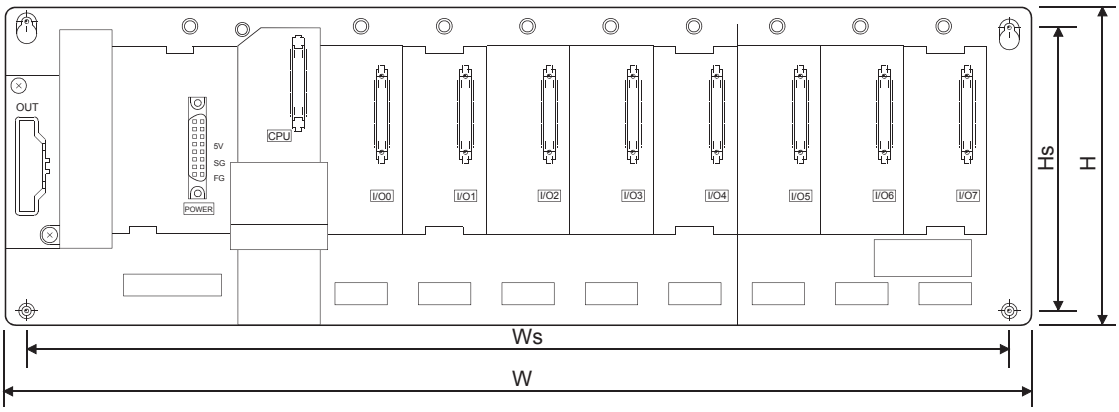
Screw	Tightening torque range
QCPU-A module fixing screw (M3 × 12)	36 to 48N·cm
AnS series module mounting screw (M4)	78 to 118N·cm
I/O module terminal block mounting screw (M3.5)	59 to 88N·cm
Power supply module terminal screw (M3.5)	

(6) When using extension cables, do not install them together with the main circuit cables (high voltage, large current), or bring them close to each other.

9.1.2 Precautions on base unit installation

(1) Installation dimensions

Mounting dimensions of each base unit are as follows:

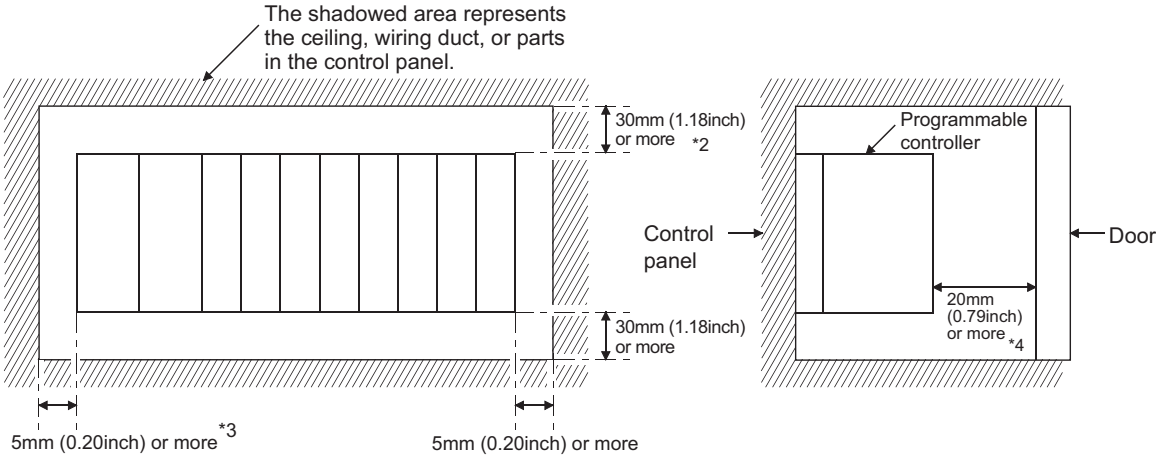


	QA1S33B	QA1S35B	QA1S38B	QA1S65B	QA1S68B
W	255 (10.04)	325 (12.80)	430 (16.93)	315 (12.40)	420 (16.54)
Ws *1	235 (9.25)	305 (12.01)	410 (16.14)	295 (11.61)	400 (15.75)
H	130 (5.12)				
Hs *1	110 (4.33)				

Unit: mm (inch)

*1 The tolerance of Ws and Hs is ± 0.3 mm.

(2) Module installation position


The shadowed area represents the ceiling, wiring duct, or parts in the control panel.
30mm (1.18inch) or more *2
Programmable controller
Control panel
Door
20mm (0.79inch) or more *4
30mm (1.18inch) or more
5mm (0.20inch) or more *3
5mm (0.20inch) or more

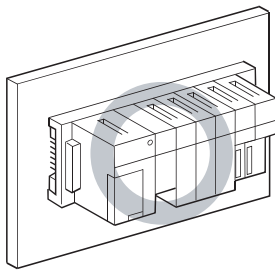
*2 In the case the height of the wiring duct is 50mm (1.97inch) or less. In other cases, the figure should be 40mm (1.57inch) or more.

*3 The figure should be 20mm (0.79inch) or more if an extension cable is connected without removing the next module.

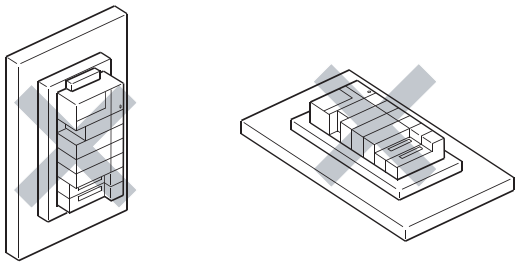
*4 The figure should be 80mm (3.15inch) or more for the connector type module.

(3) Module installation direction

(a) Install the programmable controller in the following direction to ensure ventilation for heat radiation.



(b) Do not install the programmable controller in the following directions.



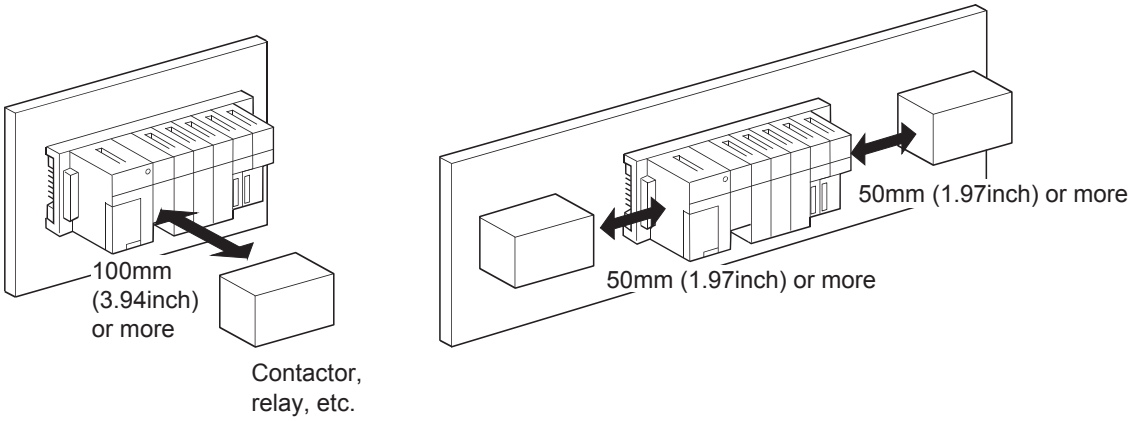
Vertical position Horizontal position

(4) Install the base unit on a flat surface.
When the base unit is installed on an uneven surface, the printed-circuit board may be strained, resulting in malfunction.

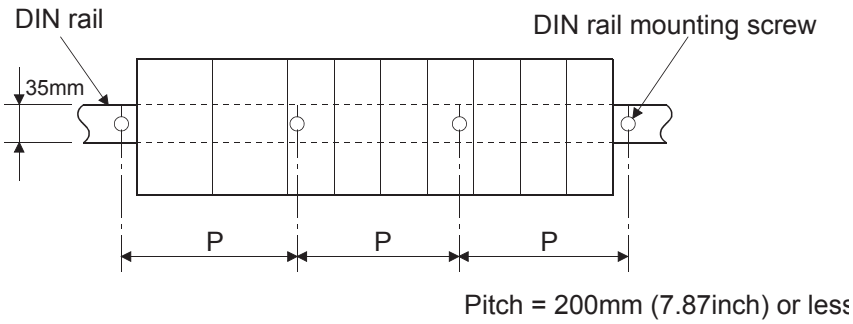
(5) Avoid sharing the same panel with any source of vibration such as a large-sized magnetic contactor or no-fuse breaker, and install to a separate panel or away from such devices.

(6) Provide the following distances between the programmable controller and devices (contactor or relay) to avoid the influence of radiation noise or heat.

- Devices installed in front of the programmable controller: 100mm (3.94 inch) or more
- Devices installed on either side of the programmable controller: 50mm (1.97 inch) or more



(7) Note the following when mounting the programmable controller to a DIN rail.
(a) Applicable DIN rail (JIS C 2812)
TH35-7.5Fe
TH35-7.5Al
TH35-15Fe
(b) DIN rail mounting screw pitch
When using DIN rail TH35-7.5Fe or TH35-7.5Al, secure the rail with the rail mounting screws with a pitch of 200mm (7.87inch) or less to ensure strength.



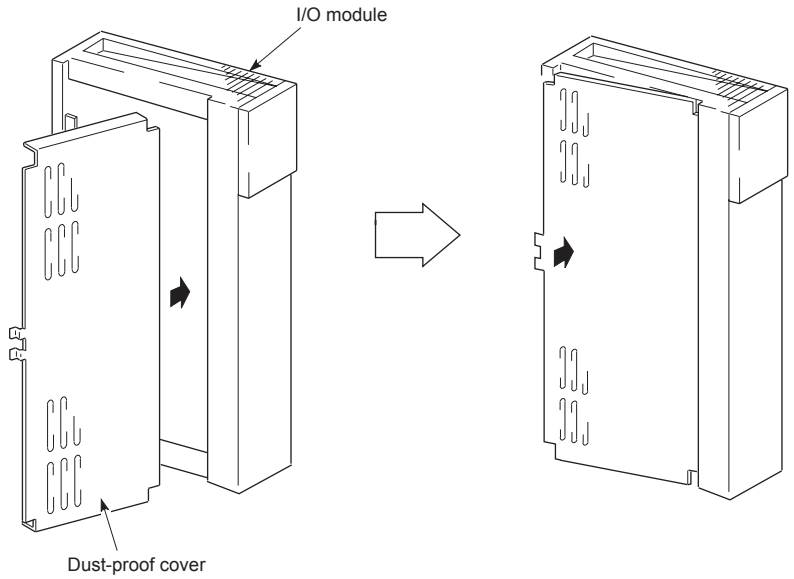
(8) When installing the base unit to DIN rain in an environment with large vibration, use a vibration-proofing bracket (A1S-PLT-D). Mounting the vibration-proofing bracket (A1S-PLT-D) enhances the resistance to vibration.
Depending on the environment to set up the base unit, it is also recommended to fix the base unit to the control panel directly.

9.1.3 Installation and removal of the dustproof cover

> **⚠ WARNING**
> ● When setting up the system, do not allow any empty slot on the base unit.
> If any slot is left empty, be sure to use a blank cover (A1SG60) or a dummy module (A1SG62) for it.
> Otherwise, internal parts of the module may be flied in the short circuit test or when an overcurrent or overvoltage is accidentally applied to the external I/O section.

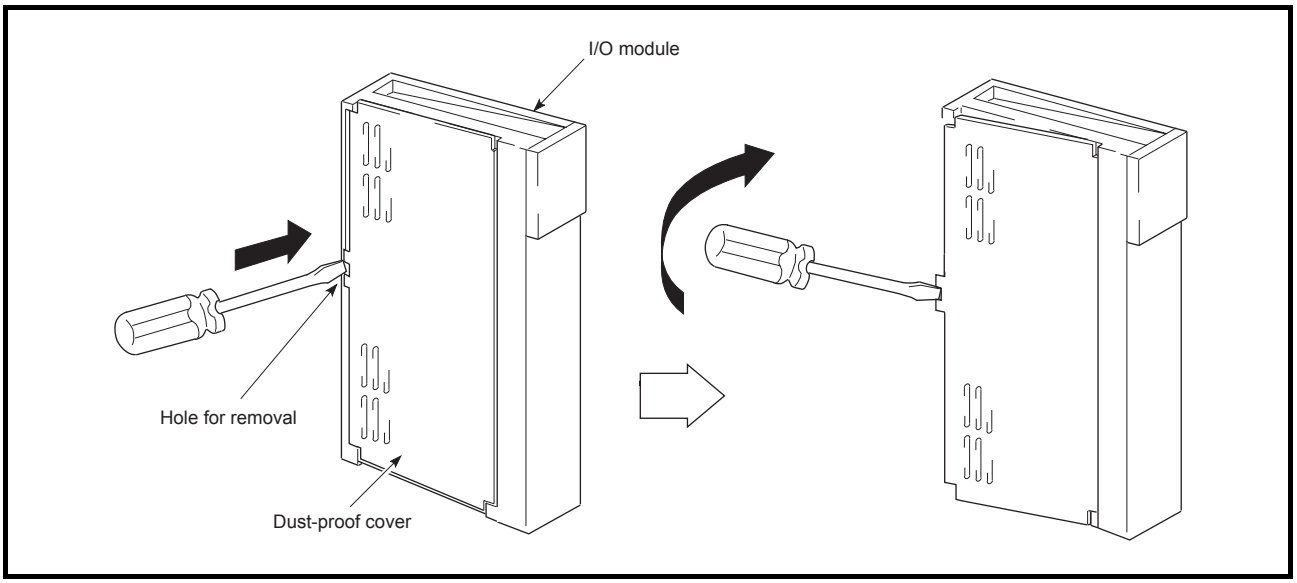
When using a QCPU-A, it is necessary to attach the dustproof cover supplied with the main base unit to the I/O module on the right of the QCPU-A to prevent foreign matter from entering the I/O module.
Be sure to attach the dustproof cover. Otherwise, foreign matter will enter the I/O module, causing a failure.
Procedures for installing and removing the dustproof cover are described below.

(1) Attachment



Insert the dustproof cover into the connector- or terminal-side groove of the I/O module first as shown in the figure, and then push the dustproof cover.

(2) Removal



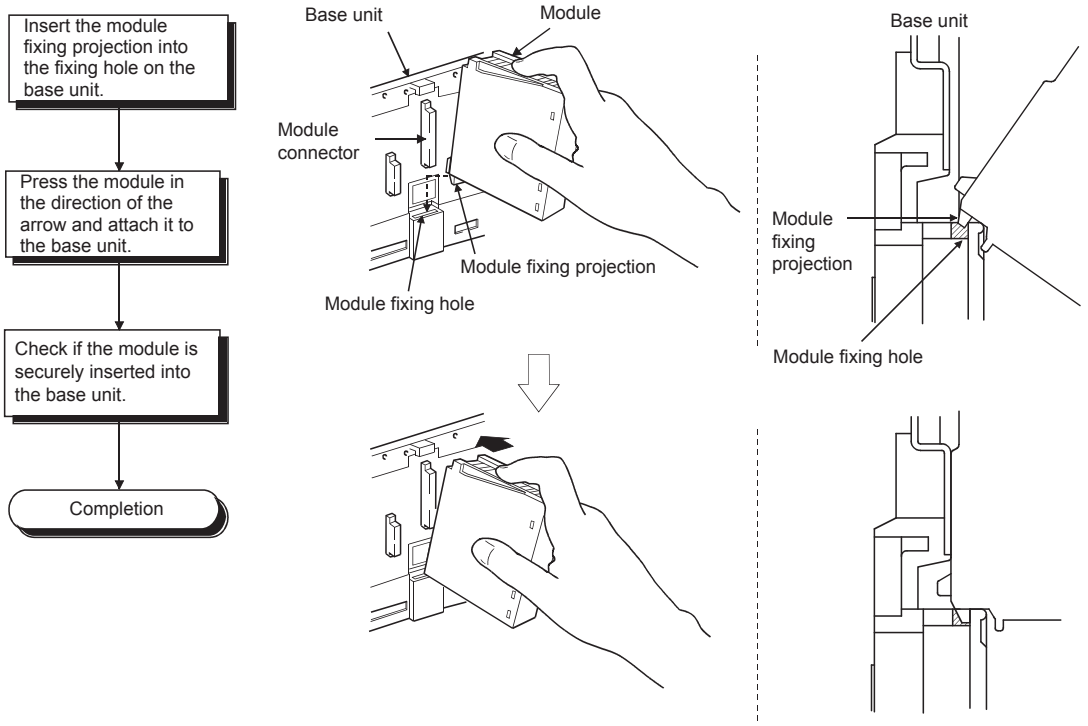
To remove the dustproof cover from the I/O module, insert the tip of a flat-head screwdriver into the hole as shown in the figure, then pry the tab of the cover out from the hole using the screwdriver.

9.1.4 Installation and removal of modules

This section explains how to install or remove the power supply module, CPU module, I/O module, and special function module, etc. to or from the base unit.

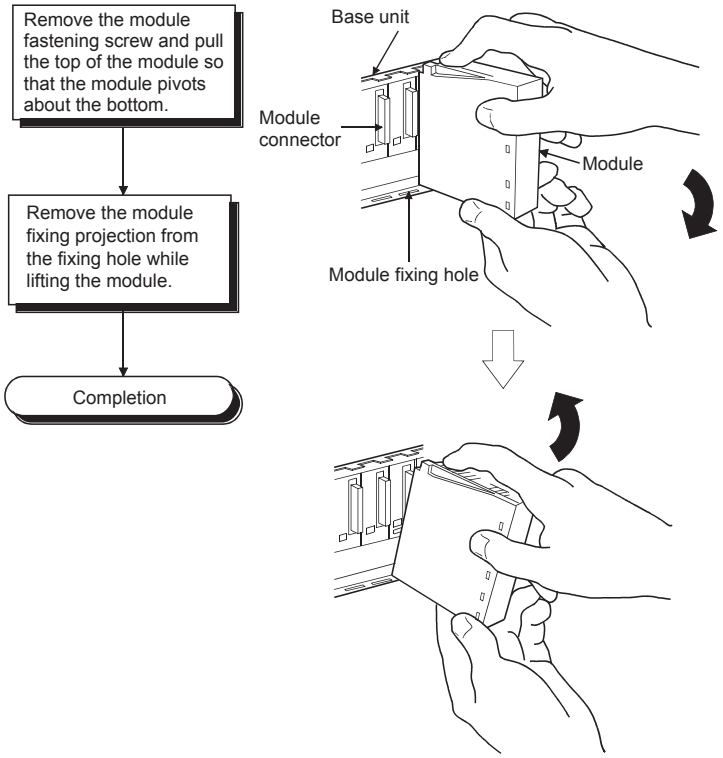
(1) Installing/removing the QCPU-A

(a) Installing the QCPU-A


Insert the module fixing projection into the fixing hole on the base unit.
Press the module in the direction of the arrow and attach it to the base unit.
Check if the module is securely inserted into the base unit.
Completion
Base unit
Module
Module connector
Module fixing projection
Module fixing hole
Base unit
Module fixing projection
Module fixing hole

POINT
(1) Insert the module fixing projection into the module fixing hole, making sure that the module is mounted vertically against the base unit. Failure to do so will damage the module connector or the module.
(2) For use in an environment with particularly large vibrations and/or shocks, fix the module to the base with screws. QCPU-A module fixing screw: M3 × 12 (prepared by the user)

(b) Removing the QCPU-A


Remove the module fastening screw and pull the top of the module so that the module pivots about the bottom.
Remove the module fixing projection from the fixing hole while lifting the module.
Completion
Base unit
Module connector
Module
Module fixing hole

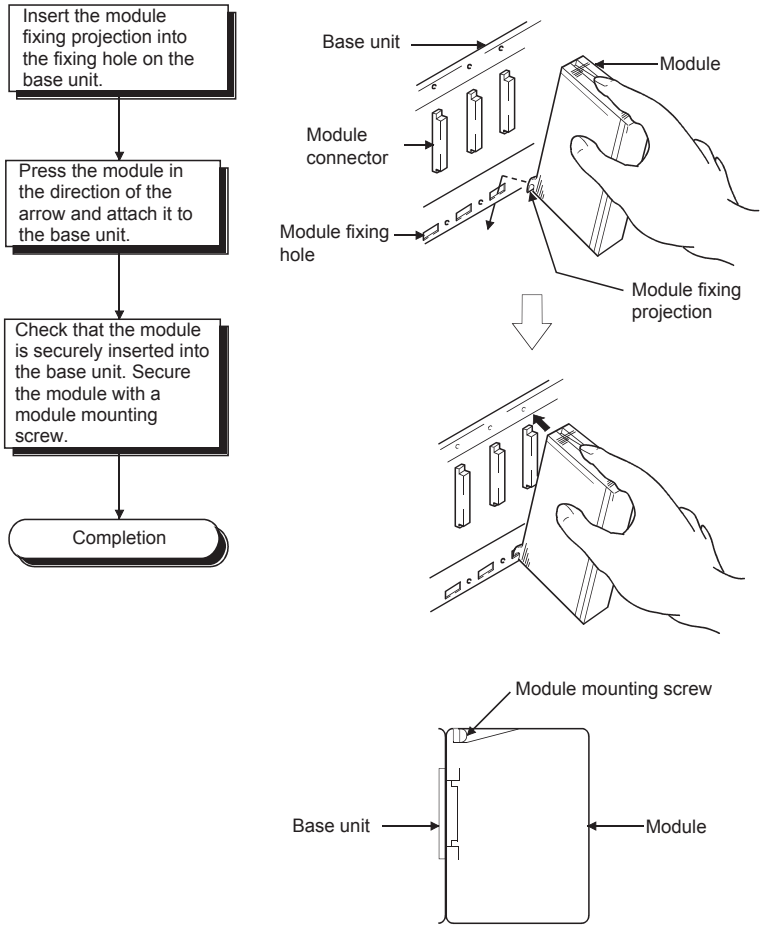
POINT
When the CPU module is secured to the base module with a module mounting screw, be sure to remove the screw first, then remove the module fixing projection from the hole. Forcefully removing the module from the base unit may damage the module.

(2) Installing/removing modules other than the QCPU-A

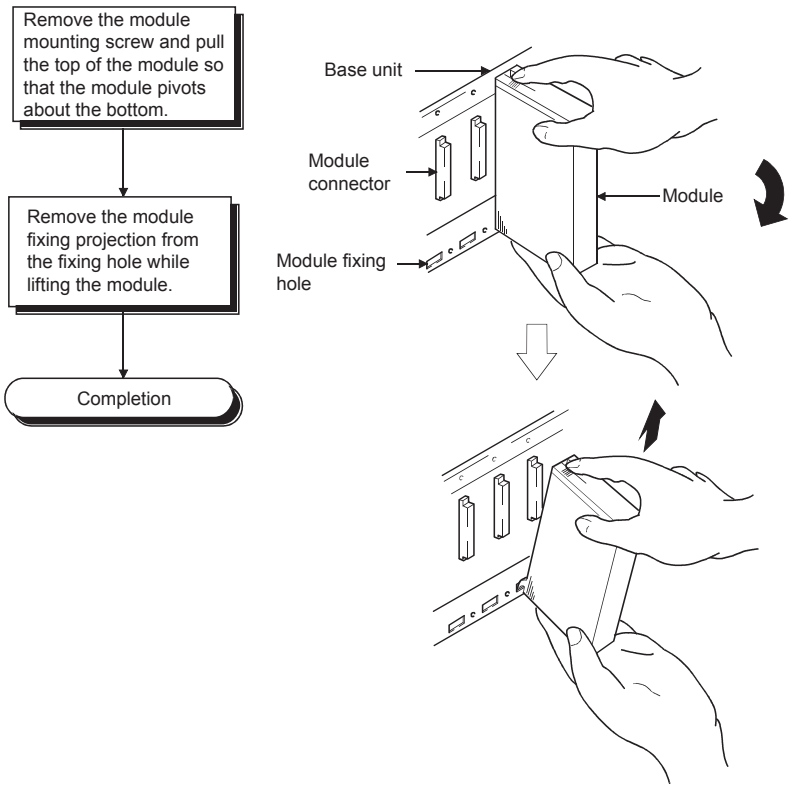
⚠ CAUTION

- Insert the module fixing projection into the fixing hole in the base unit and then tighten the module fixing screw within the specified torque.
  When no screw is tightened, even if the module is installed correctly, it may cause malfunctions, a failure or a drop of the module.
  Tightening the screw excessively may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.
- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Failure to do so may damage the module.
- Do not directly touch the conductive part or electronic components of the module.
  Doing so may cause malfunctions or a failure of the module.

(a) Installing modules other than the QCPU-A


Insert the module fixing projection into the fixing hole on the base unit.
Press the module in the direction of the arrow and attach it to the base unit.
Check that the module is securely inserted into the base unit. Secure the module with a module mounting screw.
Completion
Base unit
Module
Module connector
Module fixing hole
Module fixing projection
Module mounting screw
Base unit
Module

(b) Removing modules other than the QCPU-A
Removal procedure of the above module is explained below.

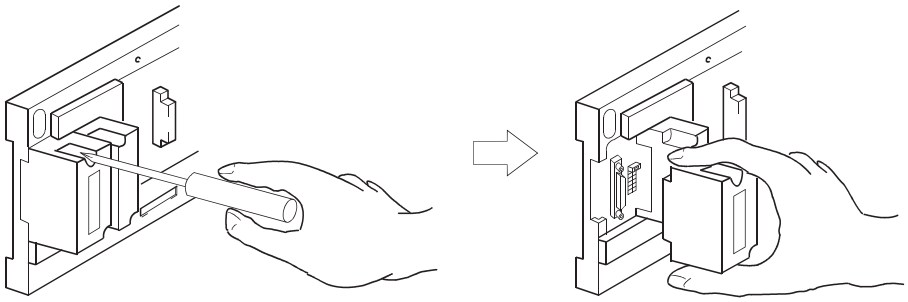

Remove the module mounting screw and pull the top of the module so that the module pivots about the bottom.
Remove the module fixing projection from the fixing hole while lifting the module.
Completion
Base unit
Module connector
Module
Module fixing hole

POINT
When removing the module, be sure to remove the module mounting screw first, then pry the module fixing projection from the module fixing hole. Forcefully removing the module from the base unit may damage the module.

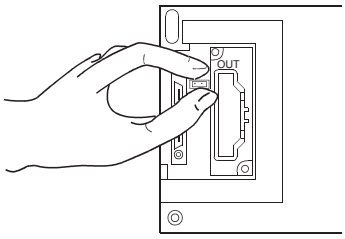
9.1.5 Extension stage number setting for the extension base unit

When using two or more extension base units, the extension stage numbers should be set with the stage number setting connectors of the extension base units. As the extension stage number is set to "1" at shipment, the first extension base unit has not to be set. Set the extension stage number as follows.

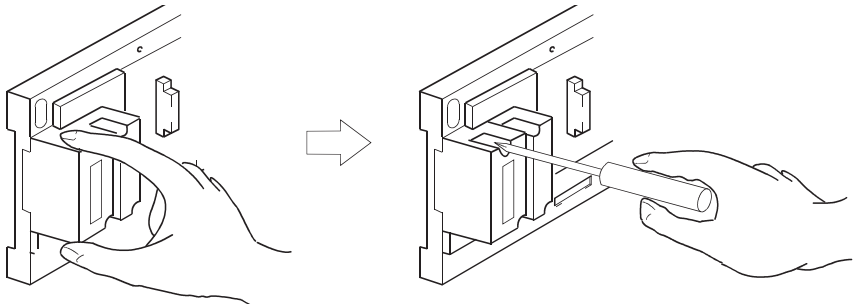
(1) The stage number setting connector is located inside the base cover of the IN connector of the extension base unit. For the extension stage number setting, refer to Section Section 6.3.
First, loosen the upper and lower screws on the base cover of the IN connector, and remove the base cover from the extension base unit.



(2) Insert a connector pin at the position of the desired stage number in the connector (PIN1) located between the IN and OUT extension cable connectors.



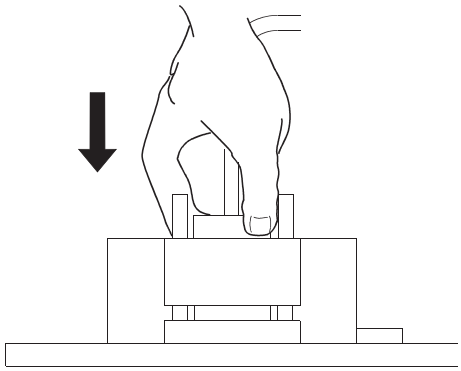
(3) Attach the base cover to the extension base unit and tighten the screws.



9.1.6 Connecting/disconnecting the extension cable

(1) Precautions on handling the extension cable

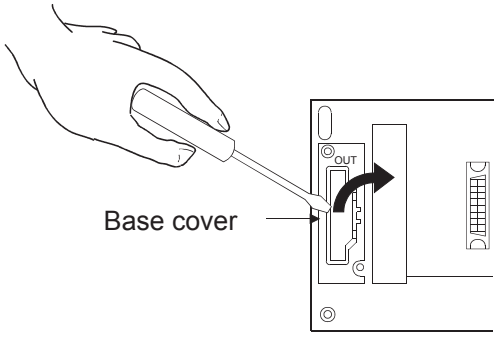
- Do not step on the extension cable.
- Be sure to attach the base cover to the base unit before connecting the extension cable to the base unit.
  (After setting the stage number of the extension base unit, attach the base cover and fasten it with screws again.)
- When installing the extension cable, provide 55mm (2.16inch) or more as the minimum allowable bend radius for the cable.
  If the bend radius is less than 55mm (2.16inch), malfunctions may occur due to the cable deterioration or breakage.
- Do not hold the ferrite cores at both ends of the cable when connecting/ disconnecting the extension cable.
  Instead, hold the connectors of the extension cable to connect/disconnect the cable.
  Holding the ferrite cores in cable connection/disconnection may cause cable breakage inside the connector.
  Also, be careful not to change the positions of the ferrite cores when handling the cable since changing the positions of the ferrite cores may change the cable characteristics.



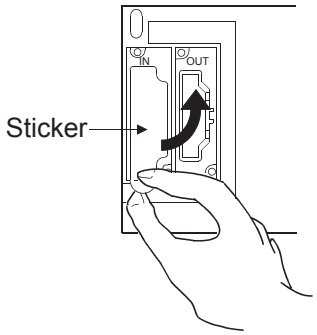
(2) Connecting the extension cable

POINT
To connect the extension cable to the main base unit and extension base unit, be sure to connect it from the OUT connector of the main base unit to the IN connector of the extension base unit. The system does not properly operate when the cable is connected from the IN to IN, OUT to OUT, or IN to OUT connectors. To connect two or more extension base units, be sure to connect the cable from the OUT connector of a first extension base unit to the IN connector of a second extension base unit.

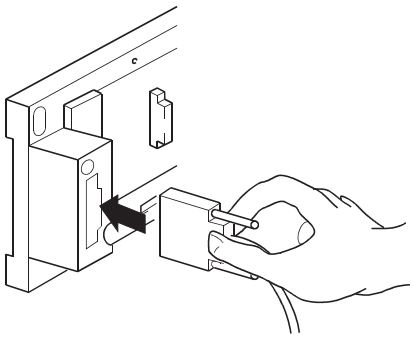
(a) To connect the extension cable to the main base unit, remove the section below OUT of the base cover with a flat-blade driver (5.5 × 75.6 × 100) or other tools. Insert the driver edge into the gap between the base cover and the section to be removed. Then raise up the driver edge so that the section will come off.
Be sure not to insert the driver edge until it damages the connector inside the base cover.
Perform the same procedure when connecting the extension cable to the OUT connector of the extension base unit.



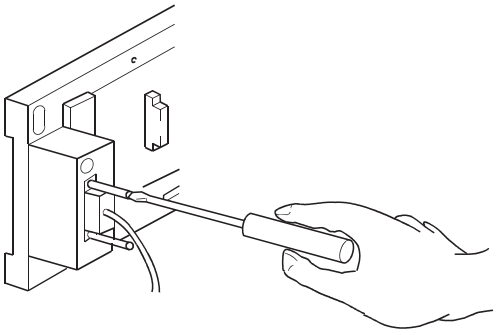
(b) To connect the extension cable to the next extension base unit, remove the sticker attached on the section below IN of the base cover.



(c) When connecting the extension cable to each base unit, hold the connector of the extension cable.



(d) After connecting the extension cable, be sure to tighten the fixing screws of the extension cable connector.
(Tightening torque: 20N · cm)



(3) Disconnecting the extension cable
When disconnecting the extension cable, confirm that the fixing screws are completely removed. Then, hold the connector of the extension cable and disconnect it.

9.2 Concept of Fail Safe Circuit

When the programmable controller is powered on or off, improper outputs may be generated temporarily depending on the delay time and start-up time differences between the programmable controller power supply and the external power supply for the control target (especially, DC).
For example, if the external power supply for a DC output module is powered on and then the programmable controller is powered on, the DC output module may generate incorrect outputs temporarily upon the programmable controller power-on. To prevent this, it is required to build a circuit by which the programmable controller is powered on first.
Also, an external power failure or programmable controller failure may lead to erroneous operation.
In order to eliminate the possibility of an system error and to ensure fail-safe operation, create a circuit (emergency stop circuit, protection circuit, interlock circuit, etc.) outside the programmable controller for the parts whose faulty operation could cause mechanical damage and/or accidents.
A system design circuit example based on the above is provided later.

⚠ WARNING

- Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
  (1) Configure external safety circuits, such as an emergency stop circuit, protection circuit, and protective interlock circuit for forward/reverse operation or upper/lower limit positioning.
  (2) When the programmable controller detects the following error conditions, it stops the operation and turn off all the outputs.
  - Overcurrent or overvoltage protection of the power supply module is activated.
  - The CPU module detects an error such as a watchdog timer error by the self-diagnostic function.
    All outputs may turn on when an error occurs in the part, such as I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to Chapter 9 LOADING AND INSTALLATION in this manual.

  (3) Outputs may remain on or off due to a failure of an output module relay or transistor. Configure an external circuit for monitoring output signals that could cause a serious acciden.
- In an output module, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.

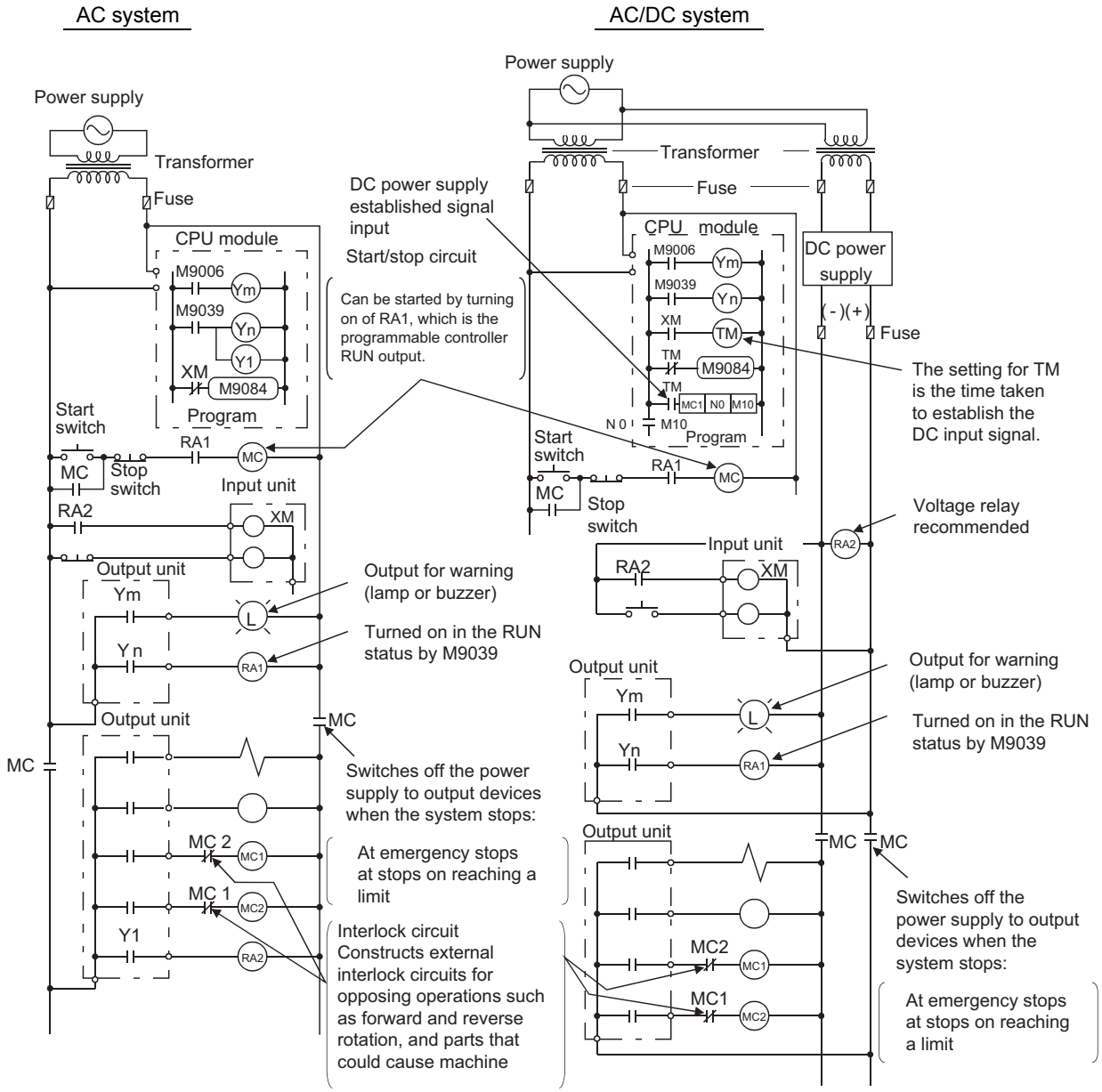
⚠ WARNING

- For the operating status of each station after a communication failure, refer to relevant manuals for the network.
  Incorrect output or malfunction due to a communication failure may result in an accident.
- When controlling a running programmable controller from a peripheral connected to the CPU module or from a personal computer connected to a special function module, configure an interlock circuit in the sequence program to ensure that the entire system will always operate safely.
  For program modification and operating status change, read relevant manuals carefully and ensure the safety before operation.
  Especially, in the case of a control from an external device to a remote programmable controller, immediate action cannot be taken for a problem on the programmable controller due to a communication failure.
  To prevent this, configure an interlock circuit in the sequence program , and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- When setting up the system, do not allow any empty slot on the base unit.
  If any slot is left empty, be sure to use a blank cover (A1SG60) or a dummy module (A1SG62) for it.
  Otherwise, internal parts of the module may be flied in the short circuit test or when an overcurrent or overvoltage is accidentally applied to the external I/O section.

⚠ CAUTION

- Do not install the control lines or communication cables together with the main circuit or power cables.
  Keep a distance of 100mm (3.94inches) or more between them.
  Failure to do so may result in malfunction due to noise.
- When a device such as a lamp, heater, or solenoid valve is controlled through an output module, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on.
  Take measures such as replacing the module with one having a sufficient current rating.

(1) System design circuit example



The procedures used to switch on the power supply are indicated below.

AC system

1) Turn on the power supply.
2) Set the CPU module to RUN.
3) Push the start switch.
4) The output devices are driven in accordance with the program when the magnetic contactor (MC) comes on.

AC/DC system

1) Turn on the power supply.
2) Set the CPU module to RUN.
3) Generate RA2 when the DC power supply starts.
4) Set the timer (TM) to "ON" upon 100% establishment of DC power supply.
   (The set value for TM shall be the period from generating RA2 to 100% establishment of DC power supply. Set 0.5 seconds for it.)
5) Push the start switch.
6) The output devices are driven in accordance with the program when the magnetic contactor (MC) comes on.
   (When a voltage relay is used for RA2, the timer in the program (TM) is not necessary.)

(2) Fail-safe measures for programmable controller failure

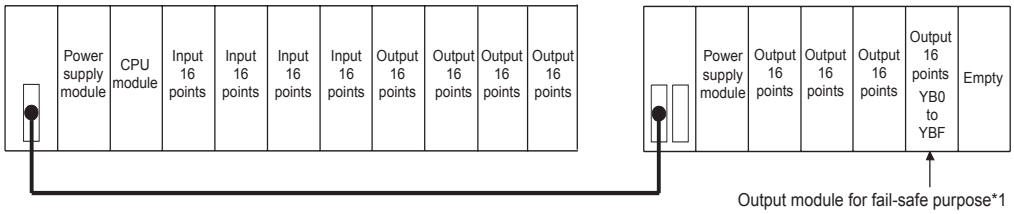
While failure of a CPU module and its memory can be detected by the self-diagnostics function, an error occurred in I/O control area may not be detected by the CPU module.

In such a case, depending on the condition of the failure, all device points could turn on or off resulting in a situation where normal operations of the control target and safety cannot be ensured.

Though Mitsubishi programmable controllers are manufactured under strict quality control, create a fail-safe circuit outside the programmable controller to prevent mechanical damage and accidents in the case of a programmable controller failure occurred due to any cause.

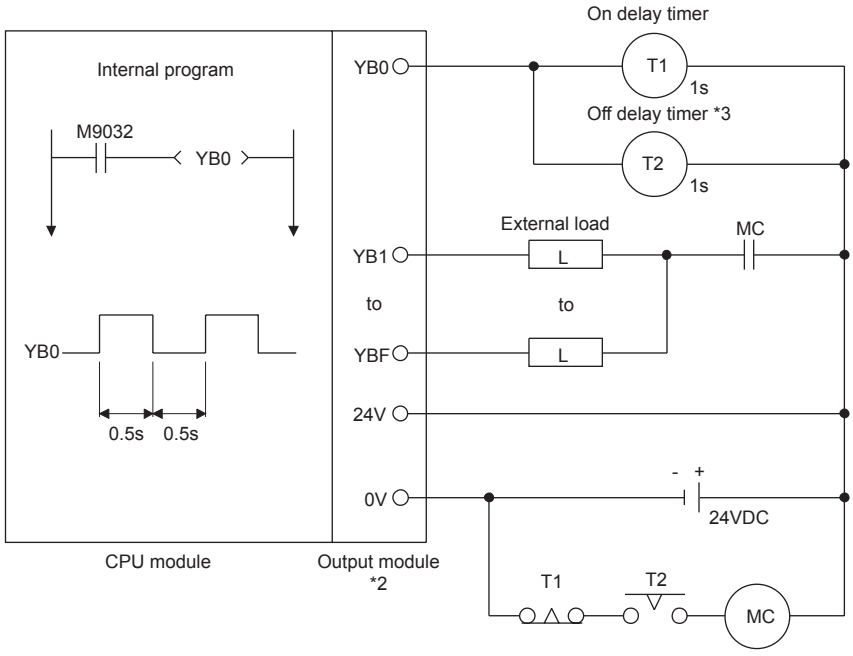
Examples of a system and its fail-safe circuitry are described below:

＜System example＞



*1 The output module for fail safe purpose should be mounted on the last slot of the system. (YB0 to YBF in the above system.)

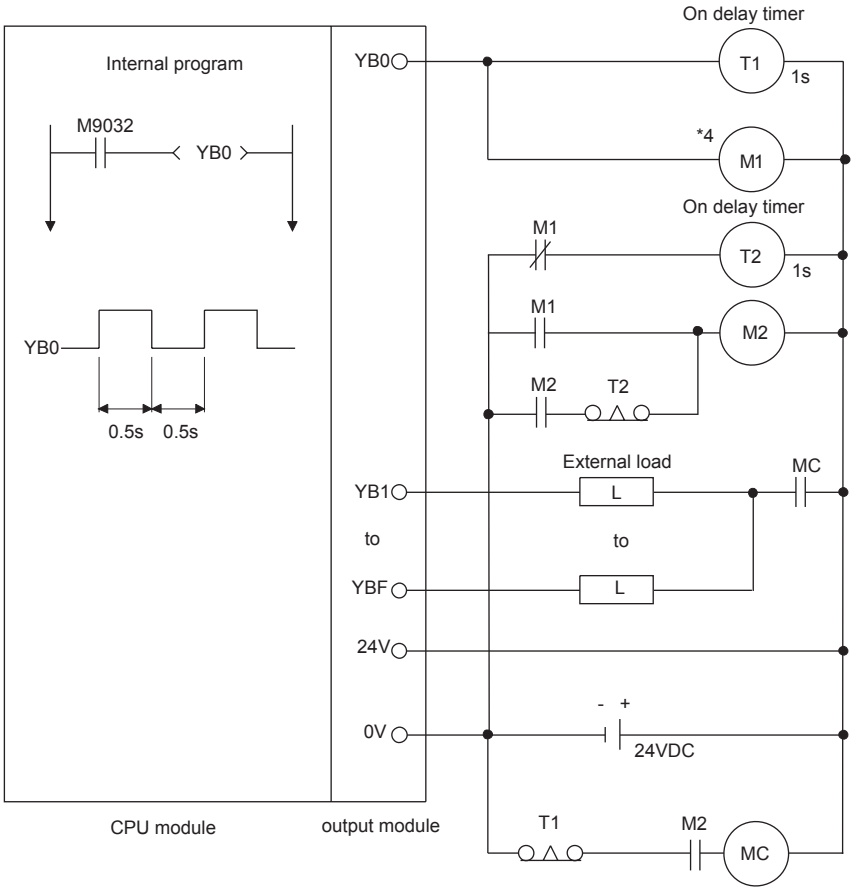
＜Fail safe circuit example＞



*2 Since YB0 turns on and off alternatively at 0.5 second intervals, use a contactless output module (a transistor is used in the above example).

*3 If an off delay timer (especially miniature timer) is not available, construct the failsafe circuit using an on delay timer shown on the next page.

When constructing a fail safe circuit using on delay timers only



*4 Use a solid state relay for the M1 relay.

9.3 Installation Environment

Avoid the following environment when you install the programmable controller system:

(3) A location in which the ambient temperature falls outside the range of 0 to 55℃.

(4) A location in which the ambient humidity falls outside the range of 10 to 90%RH.

(5) Location in which condensation may occur due to drastic changes in temperature.

(6) A location in which corrosive gas or combustible gas exists.

(7) A location in which a lot of conductive powdery substance such as dust and iron filing, oil mist, salt, or organic solvent exists.

(8) A location exposed to direct sunlight.

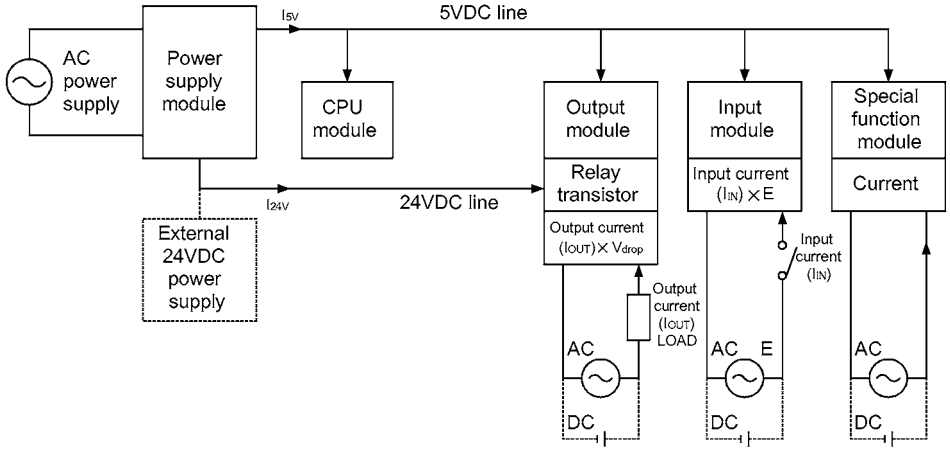
(9) A location in which strong electric fields or magnetic fields form.

(10) A location in which the main unit is exposed to direct vibration or impact.

9.4 Calculation Method of Heat Amount Generated by the Programmable Controller

It is necessary to keep the temperature of the panel which stores the programmable controller to the operating ambient temperature of the programmable controller, which is 55℃, or below. For heat dissipation design of the panel, it is necessary to know the average power consumption (heat generation) of the devices and machinery stored inside. In this section, a method to obtain the average power consumption of the programmable controller system is explained. Calculate the temperature rise inside the panel from the power consumption.

(Calculation method of average power consumption)
The power consuming parts of the programmable controller may be roughly classified into the blocks as shown below:



(1) Power consumption by power supply module
The power conversion efficiency of the power supply module is about 70%, and 30% is consumed as heat generated, thus, 3/7 of the output power is the power consumption. Therefore, the calculation formula is:

$$Wpw=\frac{3}{7}\{(I_{5V}\times 5)+(I_{15V}\times 15)+(I_{24V}\times 24)\}(W)$$

I_{5V} : Current consumption of 5VDC logic circuit of each module
I_{15V}: Current consumption of 15VDC external power supply part of special function module
I_{24V}: Average current consumption of 24VDC power supply for internal consumption of the output module
(Current consumption equivalent to the points simultaneously ON)
Not applicable to a system where 24VDC is supplied externally and a power supply module which does not have a 24VDC output is used.

(2) Total power consumption of each module at 5VDC logic part
Power of the 5VDC output circuit of the power supply module is the power consumption of each module.

$$W_{5V}=I_{5V}\times 5(W)$$

(3) Total 24VDC average power consumption of the output module (power consumption equivalent to the points simultaneously ON)
Average power of the 24VDC output circuit of the power supply module is the total power consumption of each module.

$W_{24V}=I_{24V}\times 24 \times$ Simultaneous ON ratio (W)

(4) Total 24VDC average power consumption of the output module
(power consumption equivalent to the points simultaneously ON)

$W_{OUT}=I_{OUT}\times V_{drop} \times$ Output points $\times$ Simultaneous ON ratio (W)

I_{OUT} : Output current (current actually used) (A)
V_{drop} : Voltage drop of each output module (V)

(5) Average power consumption of the input modules at the input part (power consumption equivalent to the points simultaneously ON)

$W_{IN}=I_{IN}\times E\times$ Input points $\times$ Simultaneous ON ratio (W)

I_{IN} : Input current (effective value in the case of AC) (A)
E : Input voltage (voltage for actual usage) (V)

(6) Power consumption of the external power supply part of the special function module

$W_S=I_{+15V}\times 15 + I_{-15V}\times 15 + I_{24V}\times 24$(W)

The total of the power consumption calculated for each block as above is the power consumption of the programmable controller system as a whole.

$W=W_{PW} + W_{5V} + W_{24V} + W_{OUT} + W_{IN} + W_S$ (W)

Calculate the amount of heat generation and temperature rise inside the panel from the total power consumption (W).
Simplified calculation formula to obtain temperature rise inside panel is shown next:

$$T=\frac{W}{UA}[^{\circ}C]$$

W: Power consumption of the programmable controller system as a whole (the value obtained above)
A: Inside surface area of the panel [m^2]
U: When inside temperature of the panel is kept constant by a fan, etc.....6
When the air inside the panel is not circulated 4

POINT
When the temperature rise inside the panel exceeds the specified range, it is recommended to lower the temperature inside the panel by installing a heat exchanger to the panel. If a conventional ventilation fan is used, it sucks dust along with the outside air, which may affect the programmable controller, so care must be taken.

9.5 Wiring

9.5.1 Wiring precautions

This section describes precautions for wiring the power cable and I/O wires.

⚠ WARNING

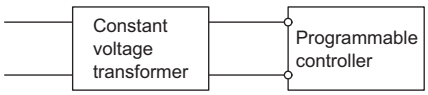
- Shut off the external power supply for the system in all phases before wiring.
  Failure to do so may result in electric shock or damage to the product.
- After wiring, attach the included terminal cover to the module before turning it on for operation.
  Failure to do so may result in electric shock.

⚠ CAUTION

- Ground the FG and LG terminals to the protective ground conductor dedicated to the programmable controller.
  Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly.
  Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.
- Do not connect multiple power supply modules to one module in parallel.
  The power supply modules may be heated, resulting in a fire or failure.
- Connectors for external connection must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered.
  Incomplete connections could result in short circuit, fire or malfunction.
- Tighten the terminal screw within the specified torque range.
  Undertightening can cause short circuit, fire, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure or malfunction.
- Mitsubishi programmable controllers must be installed in control panels.
  Connect the main power supply to the power supply module in the control panel through a relay terminal block.
  Wiring and replacement of a power supply module must be performed by maintenance personnel who is familiar with protection against electric shock.
  (For the wiring methods, refer to Section 9.5.)

(1) Wiring the power supply

(a) When voltage fluctuates outside the specified value range, connect a constant-voltage transformer.



(b) Use a power supply which generates minimal noise between wires and between the programmable controller and ground.
If excessive noise is generated, connect an isolating transformer.

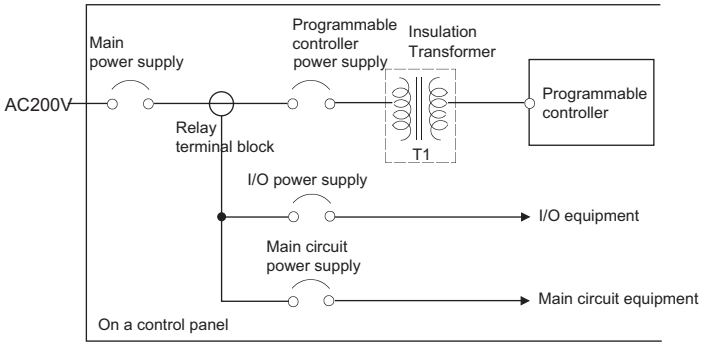
(c) When using a power transformer or an isolating transformer to reduce the voltage from 200VAC to 100VAC, its capacity must be equal to or greater than the corresponding value shown in the following table.

Power Supply Module	Transformer Capacity
A1S61PN	110VA× n
A1S62PN	110VA× n

n: Indicates the number of power supply modules.

(d) Separate the programmable controller's power supply line from the lines for I/O devices and power devices as shown below.
When there is much noise, connect an isolating transformer.

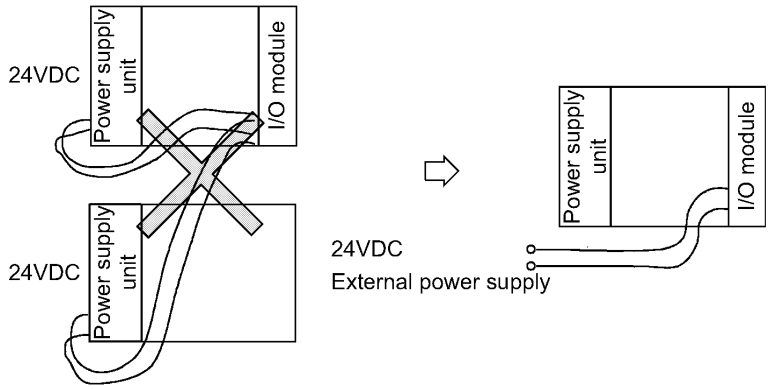
(e) Taking rated current or inrush current into consideration when wiring the power supply, be sure to connect a breaker or an external fuse that have proper blown and detection.
When using a single programmable controller, a 10A breaker or an external fuse are recommended for wiring protection.



(f) Precautions on using the 24VDC output for the A1S62PN power supply module

⚠ CAUTION
● Do not connect multiple power supply modules to one module in parallel.
The power supply modules may be heated, resulting in a fire or failure.

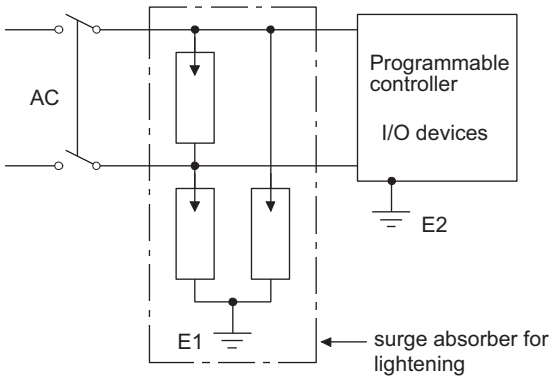
If the 24VDC output power from a single power supply module is insufficient, supply it from the external 24VDC power supply.



(g) Twist the 100VAC, 200VAC or 24VDC wires as tightly as possible, and use the minimum length to make connection between modules.
Also, use a thick wire (max. 2 mm^2) to minimize voltage drop.

(h) Do not install 100VAC and 24VDC wires together with main circuit wires (high voltage and large current) or I/O signal lines (including common line). Provide a distance of 100mm (3.94inch) or more between them if possible.

(i) As measures against lightning surges, connect a lightning surge absorber as shown below.

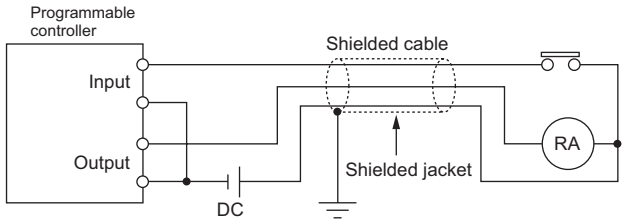


POINT
(1) Ground the lightening surge absorber (E1) and the programmable controller (E2) separately from each other. (2) Select a lightning surge absorber whose voltage does not exceed the maximum allowable circuit voltage even when line voltage reaches the maximum.

(2) Wiring I/O equipment

CAUTION	● Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm (3.9inches) or more between them. Failure to do so may result in malfunction due to noise.

(a) The applicable wire size for a terminal block connector is 0.75 to 2mm^2. It is recommended to use wire of 0.75mm^2 for easy use.
(b) Run the input line and output line away from each other.
(c) Separate the I/O signal lines (including common line) at least 100mm (3.94inch) away from the main circuit line carrying high voltage and large current.
(d) If it is not possible, use a batch shielding cable and ground it on the programmable controller side.
However, ground it on the opposite side in some cases.



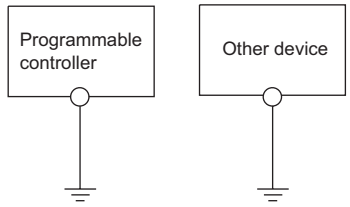
NOTE

(e) When ducts are used for wiring, securely ground them.
(f) Separate the 24VDC I/O wires from the 100VAC and 200VAC lines.
(g) In a long distance wiring of 200m (686.67 ft.) or longer, leak current due to capacitance may cause failure.
(h) As protective measures against lightning surges, separate the AC wiring from the DC wiring and connect a lightning surge absorber as shown in (1) (i).
Failure to do so increases the risk of I/O equipment failure due to lightning.

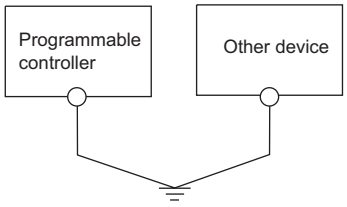
(3) Grounding

CAUTION	● Ground the FG and LG terminals to the protective ground conductor dedicated to the programmable controller. Failure to do so may result in electric shock or malfunction.

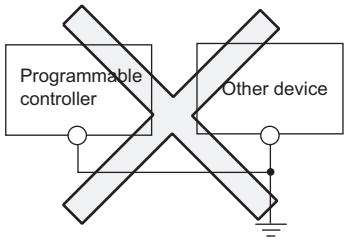
(a) Carry out the independent grounding if possible.
(b) If independent grounding is impossible, carry out the shared grounding (2) as shown below.



(1) Independent grounding ..... Best



(2) Shared grounding ..... Good

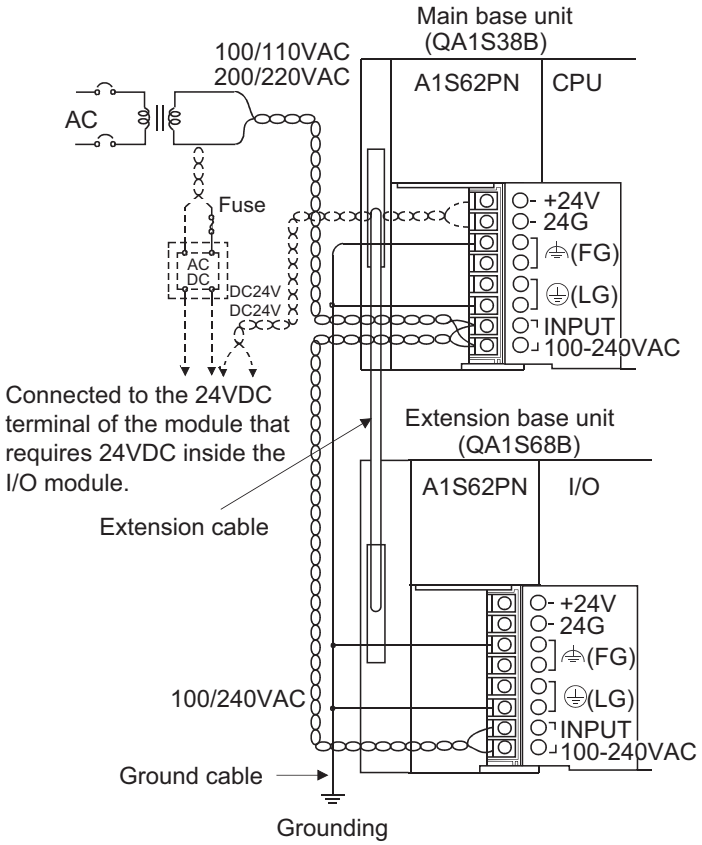


(3) Common grounding ..... Not allowed

(c) Use the cable of $2mm^2$ or more for grounding.
Set the grounding point closer to the programmable controller to make the grounding cable short as possible.
(d) If any malfunction occurs due to grounding, disconnect either or both of the LG and FG terminals of the base unit from the ground.

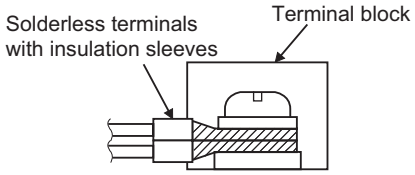
9.5.2 Wiring to module terminals

This section explains the wiring of power cables and ground wires to the main and extension bases.



POINT

(1) Use the thickest possible (max. 2 mm^2 (14 AWG)) wires for the 100/200 VAC and 24 VDC power cables. Be sure to twist these wires starting at the connection terminals. For wiring a terminal block, be sure to use a solderless terminal. To prevent short-circuit due to loosening screws, use the solderless terminals with insulation sleeves of 0.8 mm (0.03 inch) or less thick. The number of the solderless terminals to be connected for one terminal block are limited to 2.



(2) Be sure to ground the LG and FG terminals. Failure to do so may cause the programmable controller to be susceptible to noise. Note that LG terminals include the potential as half as that of input voltage; you might get an electric shock when you touch them.

(3) A1S61PN and A1S62PN do not need to be switched as the are 100 to 240VAC wide-range.

9.6 Precautions when Connecting the Uninterruptible Power Supply (UPS)

Connect the programmable controller system to the uninterruptible power supply (UPS), while paying attention to the followings.

Use the on-line UPS or line interactive UPS (voltage distortion of 5% or less.)
Alternatively, use the off-line system UPS, i.e., FREQUPS-F series with serial number P or later (manufactured by Mitsubishi Electric). Example: FW-F10-03.K/0.5K
Do not use the off-line system UPS other than above.

10 MAINTENANCE AND INSPECTION

⚠ WARNING

- Do not touch any terminal during power distribution.
  Doing so may cause an electric shock.
- Properly connect batteries.
  Do not charge, disassemble, heat or throw them into the fire and do not make them short-circuited and soldered. Incorrect battery handling may cause personal injuries or a fire due to exothermic heat, burst and/or ignition.
- Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screws or module mounting screws.
  Failure to do so may result in an electric shock.
  If they are too loose, it may cause a short circuit or malfunctions.
  If too tight, it may damage the screw and/or module, resulting in a drop of the module, a short circuit or malfunctions.

⚠ CAUTION

- When performing online operations (especially, program modification, forced output or operating status change) by connecting a peripheral device to the running CPU module, read the manual carefully and ensure the safety.
  Incorrect operation will cause mechanical damage or accidents.
- Do not disassemble or modify each of modules.
  Doing so may cause failure, malfunctions, personal injuries and/or a fire.
- When using a wireless communication device such as a mobile phone, keep a distance of 25cm (9.84inch) or more from the programmable controller in all directions.
  Failure to do so may cause malfunctions.
- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Failure to do so may result in failure or malfunctions of the module.
- Do not drop or apply any impact to the battery.
  Doing so may damage the battery, resulting in electrolyte spillage inside the battery.
  If any impact has been applied, discard the battery and never use it.
- Before handling modules, touch a grounded metal object to discharge the static electricity from the human body.
  Failure to do so may cause failure or malfunctions of the module.

In order to use the programmable controller always in good condition, conducting daily and periodical maintenance/inspection on the following items are strongly recommended.

10.1 Daily Inspection

Dairy inspection items recommended are shown in Table 10.1.

Table 10.1 Dairy inspection

Item	Check item		Content of inspection	Judgement	Action
1	Installation condition of the base unit		Confirm if installation screws are not loose or cover is not detached.	It is installed securely.	Retighten the screw.
2	Installation condition of the I/O modules		Confirm if the module mounting screw is firmly tightened.	The mounting screws are firmly tightened.	Firmly tighten the module mounting screw.
3	Connection condition		Loosening of terminal screw	No loosening.	Retighten the terminal screw.
			Proximity of solderless terminals.	There is an appropriate distance.	Correct the distance.
			Connector areas of extension cable	No loosening at connectors.	Retighten the connector fixing screw.
4	LEDs on the main module	POWER LED	Confirm it is on.	The LED is on. (Faulty if it is off.)	Refer to Section 11.2.2.
		MODE LED	Confirm it is on.	The LED is on. (Faulty if it is off.)	Refer to Section 11.2.3.
		RUN LED	Confirm it is on in the "RUN" state.	The LED is on. (Faulty if it is off or flickering.)	Refer to Section 11.2.4 Section 11.2.5.
		ERR. LED	Confirm it is on when an error occurs.	This LED is off. (On when an error occurs.)	Refer to Section 11.2.6 Section 11.2.7.
		Input LED	Confirm if it correctly turns on and off.	The LED is on when input is on, and off when input is off. (Faulty other than the above.)	Refer to Section 11.4.1.
		Output LED	Confirm if it correctly turns on and off.	The LED is on when output is on, and off when output is off. (Faulty other than the above.)	Refer to Section 11.4.2.

10.2 Periodic Inspection

Inspection on items shown below should be conducted once or twice every six months to a year. Conduct the inspection when the equipment is moved or modified, or wiring is changed.

Table 10.2 Periodic inspection

Item	Check item		Content of inspection	Judgement	Action
1	Ambient environment	Ambient temperature	Measure with temperature and humidity gauge. Measure presence of corrosive gasses.	0 to 55℃	When used in a panel, temperature inside the panel is the ambient temperature.
		Ambient humidity		10 to 90%RH	
		Atmosphere		There is no corrosive gas present.	
2	Line voltage check		Measure voltage between 100/200VAC terminals.	85 to 264VAC	Change the power supply.
3	Installation condition	Loosening, backlash	Test by moving the module.	Must be installed solidly.	Retighten the screw.
		Adhesion of dirt or foreign matters	Visual inspection	No adhesion.	Remove and clean.
4	Connection conditions	Loosening of terminal screw	Retighten with a screwdriver.	No loosening.	Retighten.
		Proximity of solderless terminals	Visual inspection	There is an appropriate distance.	Correct the distance.
		Loosening of connector	Visual inspection	No loosening.	Retighten the connector fixing screw.
5	Battery		Confirm M9006 or M9007 is off with a peripheral device in the monitoring mode.	(Preventive maintenance)	Even when there is no low-battery display, replace if specified life is exceeded.

10.3 When Reoperating a Programmable Controller After Storing it with a Battery Unconnected

When reoperating after a battery is uncounted and the programmable controller is stored, the contents of built-in RAM, device data, and memory card may be undefined.
For this reason, make sure to clear the built-in RAM memory (programmable controller memory all clear) in the CPU module by peripheral devices and operate latch clear by the RUN/STOP key switches before starting the operation again.
After the built-in RAM clear, latch clear of the CPU module, and format of the memory card, write the backed-up memory contents to the CPU module and memory card before saving.

The relationship between the backed-up memory and the batteries is explained below.

The relationship between the backed-up memory and the batteries

Memory		Battery	
		Battery of the QCPU Module	Battery Incorporated in a Memory Card
CPU module	Built-in RAM	○	×
	Built-in ROM	– (Battery back up is not required.)	
	Device memory	○	×
Memory card	SRAM card	×	○

○: Battery is backed up. × : Battey is not backed up.

Before resuming the operation, clear/format the memory for which a battery is backed up in the table above with a peripheral device.

For memory clear/format operations, refer to the following manuals.
- GX Developer Operating Manual
- Type A6GPP/A6PHP Operating Manual
- Type SW □ IVD-GPPA Operating Manual

POINT

(1) Make sure to back up each memory contents before storing a programmable controller.
(2) When a programmable controller power supply is on or CPU module reset is cancelled, a CPU module reviews the status of data below, and initializes all the data if detecting an error.
  • Latch data (latch relay (L), devices in latch setting range set in the parameter)
  • Sampling trace data
  • Status latch data
  • Special relay M9102 (SFC program continue start)

10.4 When a Programmable Controller is Reoperated After Stored with the Battery Over the Battery Life

If a programmable controller is reoperated after storing with a battery exceeded its guaranteed life, the contents of built-in RAM, device data, and memory card may be undefined. For this reason, make sure to clear the built-in RAM memory (programmable controller memory all clear) in the CPU module by peripheral devices and operate latch clear by the RUN/STOP key switches before starting the operation again.
After the built-in RAM clear, latch clear of the CPU module, and format of the memory card, write the backed-up memory contents to the CPU module and memory card before saving.

The relationship between the backed-up memory and the batteries is explained below.

The relationship between the backed-up memory and the batteries

Memory		Battery	
		Battery of the QCPU Module	Battery Incorporated in a Memory Card
CPU module	Built-in RAM	○	×
	Built-in ROM	– (Battery back up is not required.)	
	Device memory	○	×
Memory card	SRAM card	×	○

○: Battery is backed up. × : Battey is not backed up.

Before resuming the operation, clear/format the memory for which a battery is backed up in the table above with a peripheral device.

For memory clear/format operations, refer to the following manuals.
- GX Developer Operating Manual
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POINT

(1) Make sure to back up each memory contents before storing a programmable controller.
(2) When a programmable controller power supply is on or CPU module reset is cancelled, a CPU module reviews the status of data below, and initializes all the data if detecting an error.
  • Latch data (latch relay (L), devices in latch setting range set in the parameter)
  • Sampling trace data
  • Status latch data
  • Special relay M9102 (SFC program continue start)

11 TROUBLESHOOTING

The description, cause investigation, and corrective actions of each error which may occur during system usage are described.

11.1 Fundamentals of Troubleshooting

Besides using obviously highly-reliable devices to increase system reliability, it is an important point to quickly start up the system again when an error occurs.
In order to quickly start up the system, find the cause of the problem and resolve it. There are the following three basic points to be aware of when performing troubleshooting.

(1) Visual confirmation
Confirm the following points:
(a) Machine operation (stop status and operation status)
(b) Power supply ON/OFF
(c) I/O equipment status
(d) Wiring status (I/O wires and cable)
(e) Display status of each display indicator (POWER LED, RUN LED, ERR. LED, I/O LED, etc.)
(f) Status of each setting switch (extension base, latch, etc.)

After confirming (a) to (f), connect a peripheral device and observe the operation status of the programmable controller and program contents.

(2) Error confirmation
Observe how the error changes by performing the following operations:
(a) Set the RUN/STOP switch to "STOP".
(b) Reset using the RUN/STOP switch.
(c) Turn on and off the power supply.

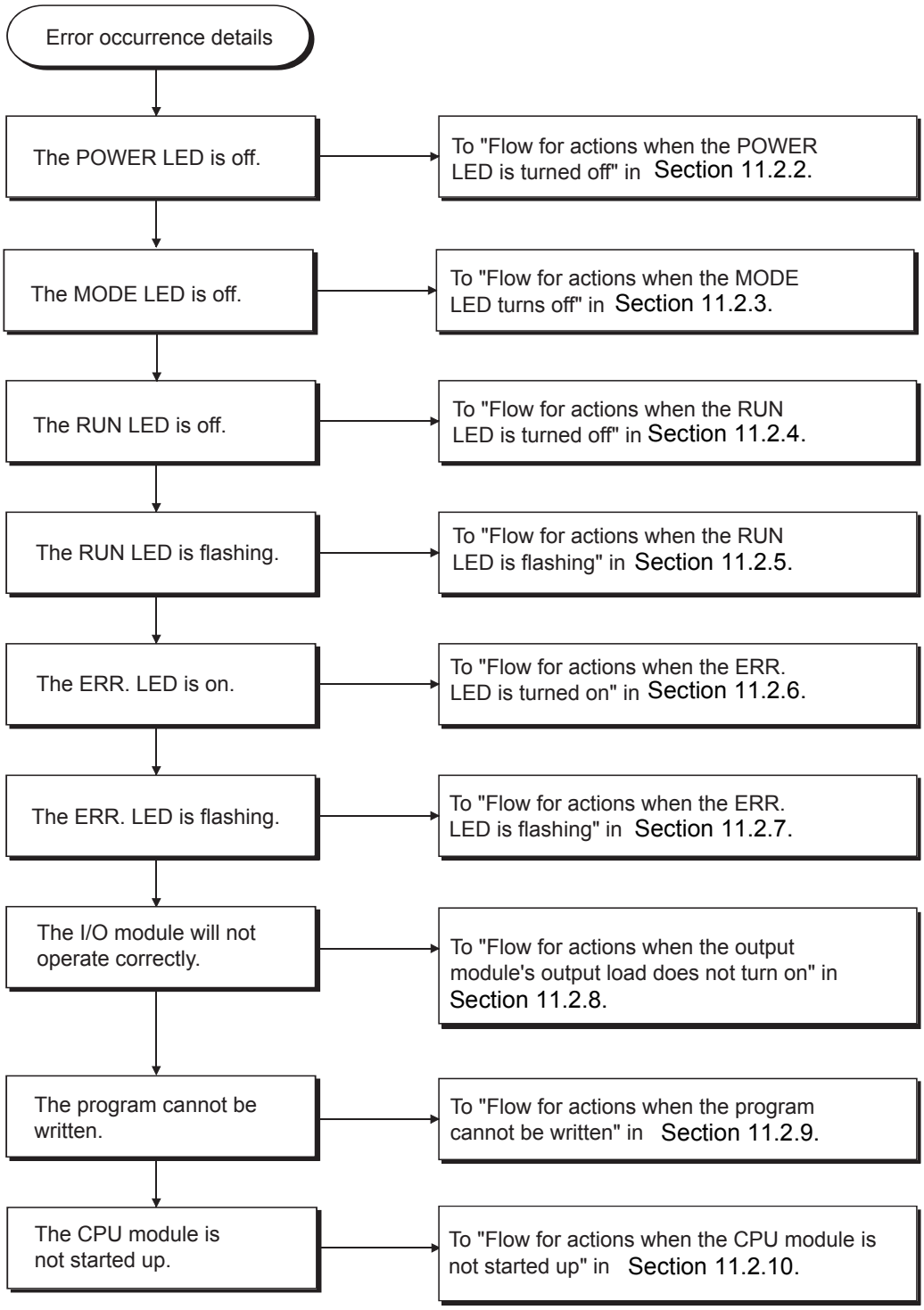
(3) Narrow down the range.
By performing the (1) and (2) above, assume the faulty area in the following:
(a) Programmable controller or external devices?
(b) I/O module or others?
(c) Sequence program?

11.2 Troubleshooting

The error definition investigation method, error definition corresponding to the error code, and corrective actions are described.

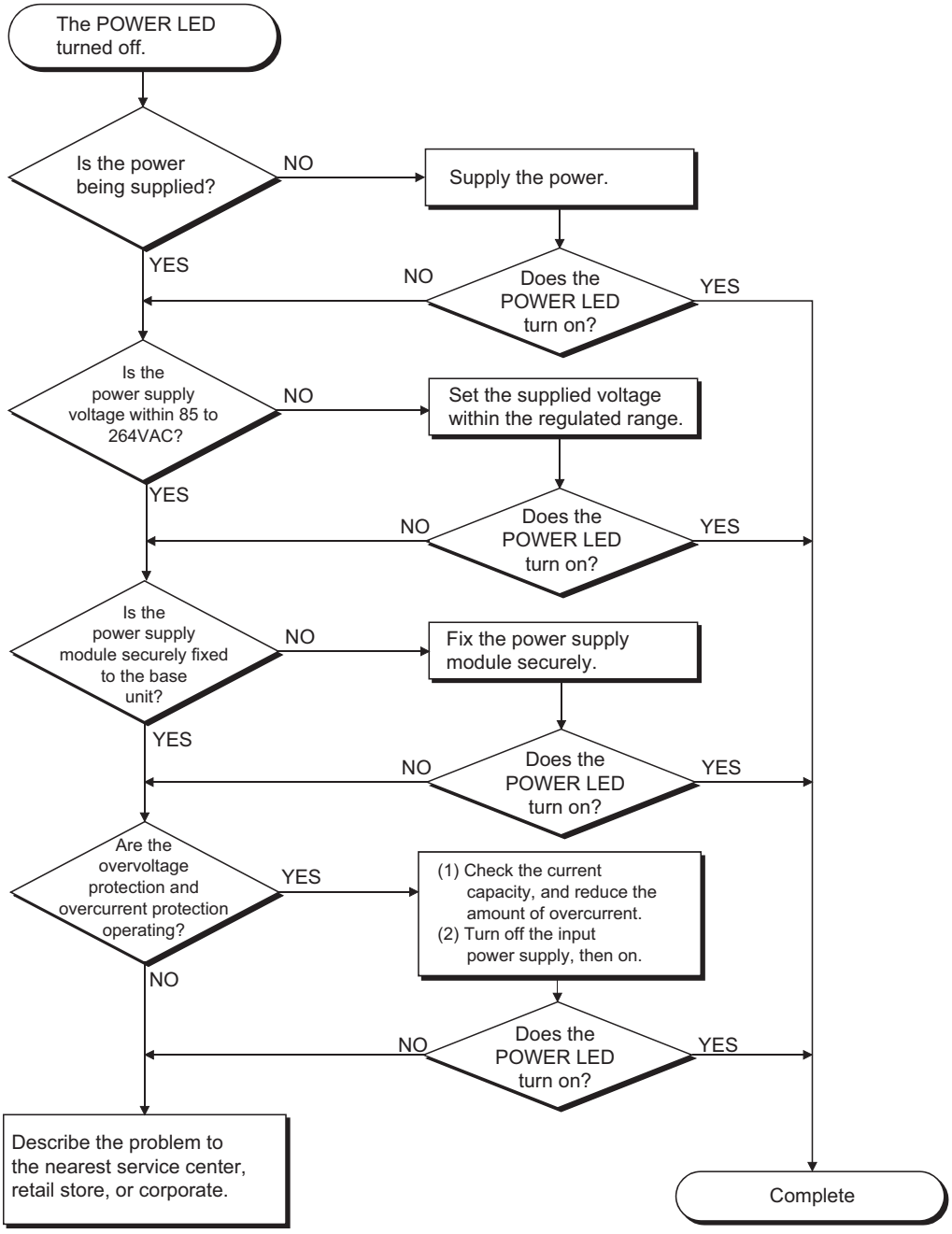
11.2.1 Troubleshooting flowchart

The error definitions are described by events.


Error occurrence details
The POWER LED is off.
To "Flow for actions when the POWER LED is turned off" in Section 11.2.2.
The MODE LED is off.
To "Flow for actions when the MODE LED turns off" in Section 11.2.3.
The RUN LED is off.
To "Flow for actions when the RUN LED is turned off" in Section 11.2.4.
The RUN LED is flashing.
To "Flow for actions when the RUN LED is flashing" in Section 11.2.5.
The ERR. LED is on.
To "Flow for actions when the ERR. LED is turned on" in Section 11.2.6.
The ERR. LED is flashing.
To "Flow for actions when the ERR. LED is flashing" in Section 11.2.7.
The I/O module will not operate correctly.
To "Flow for actions when the output module's output load does not turn on" in Section 11.2.8.
The program cannot be written.
To "Flow for actions when the program cannot be written" in Section 11.2.9.
The CPU module is not started up.
To "Flow for actions when the CPU module is not started up" in Section 11.2.10.

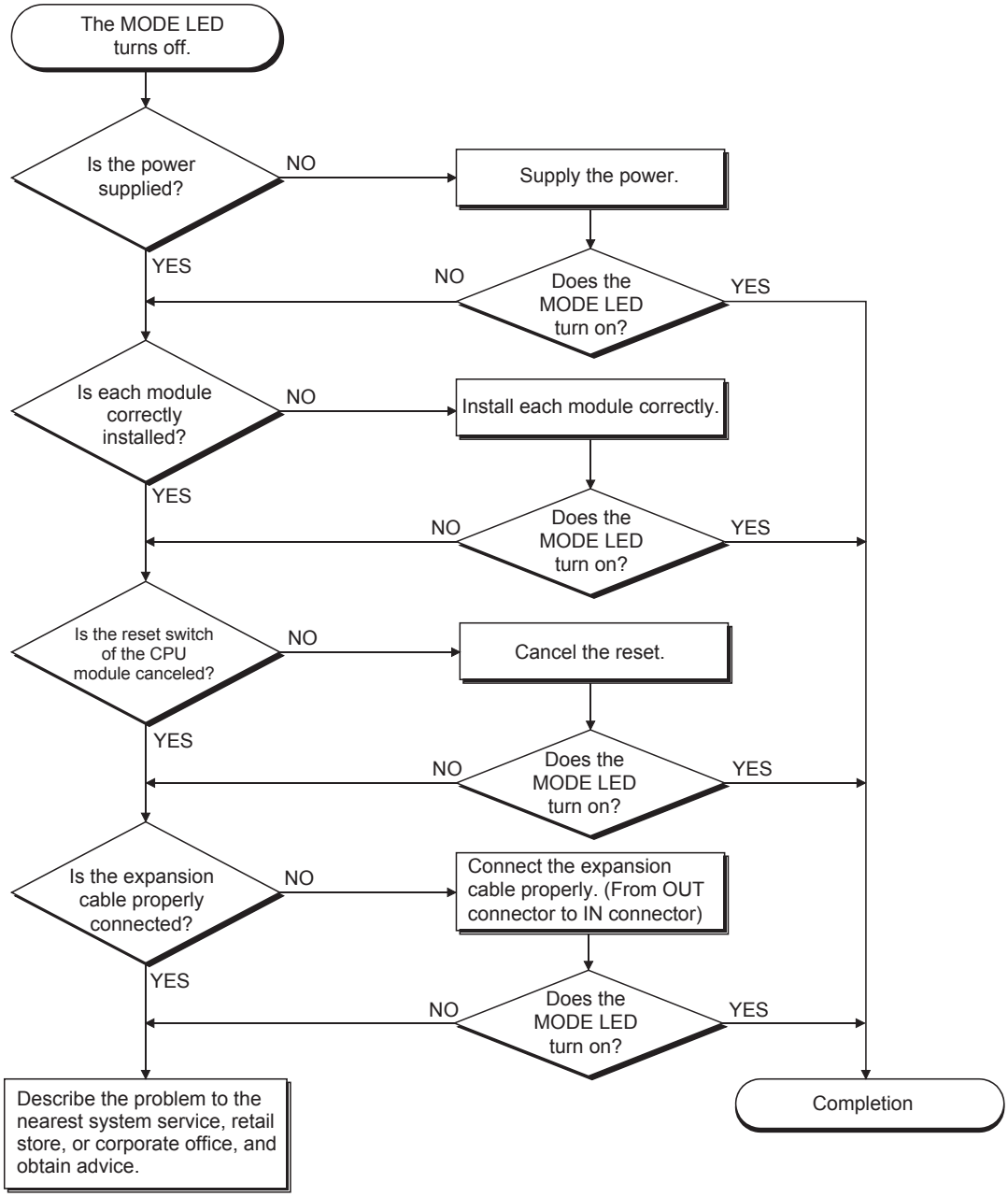
11.2.2 Flow for actions when the POWER LED is turned off

The corrective action when the POWER LED turns off when the power supply is turned on or during operation is described.


The POWER LED turned off.
Is the power being supplied?
NO
Supply the power.
YES
NO
Does the POWER LED turn on?
YES
Is the power supply voltage within 85 to 264VAC?
NO
Set the supplied voltage within the regulated range.
YES
NO
Does the POWER LED turn on?
YES
Is the power supply module securely fixed to the base unit?
NO
Fix the power supply module securely.
YES
NO
Does the POWER LED turn on?
YES
Are the overvoltage protection and overcurrent protection operating?
YES
(1) Check the current capacity, and reduce the amount of overcurrent.
(2) Turn off the input power supply, then on.
NO
NO
Does the POWER LED turn on?
YES
Describe the problem to the nearest service center, retail store, or corporate.
Complete

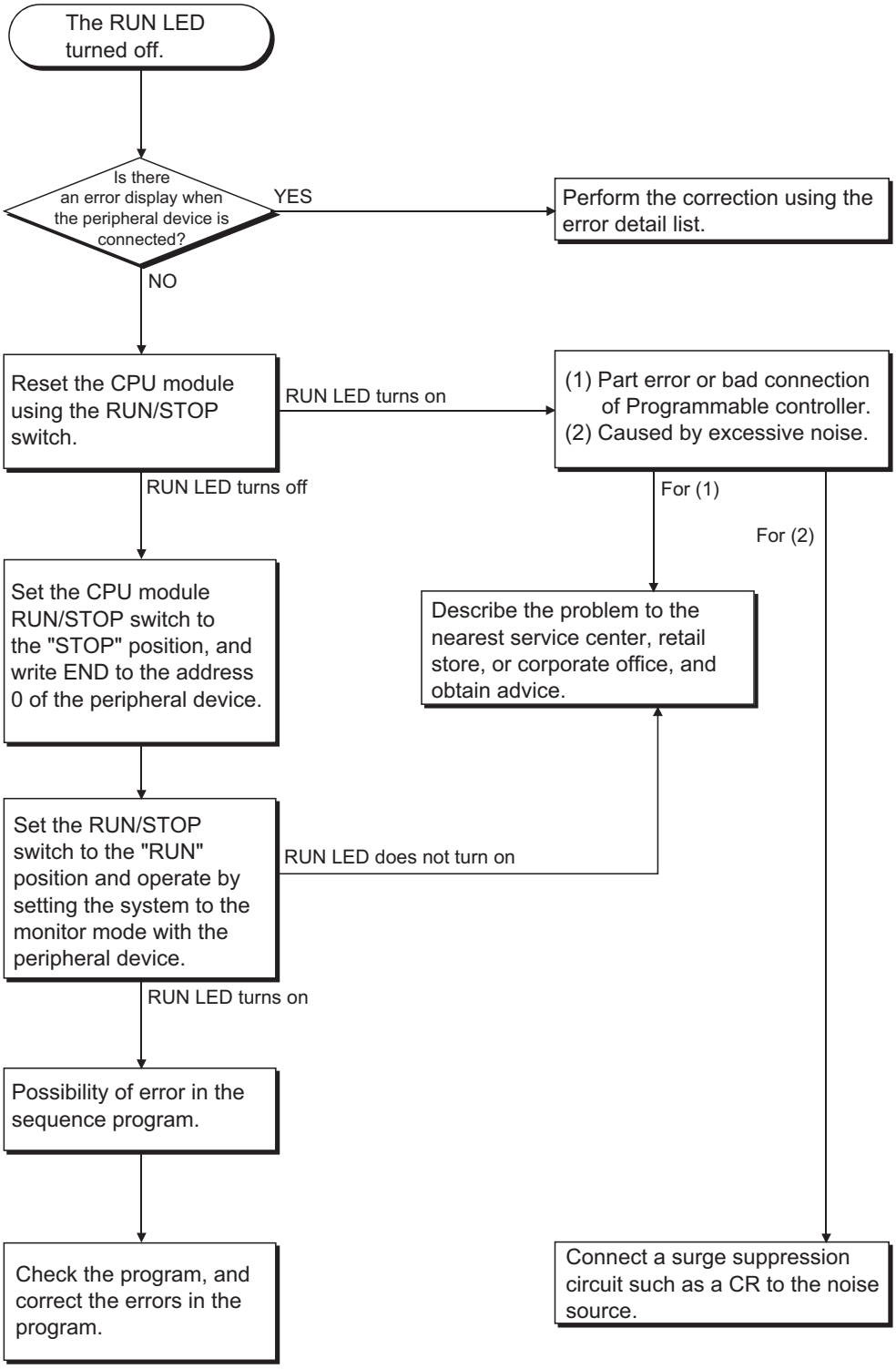
11.2.3 Flow for actions when the MODE LED turns off

The corrective action when the MODE LED turns off at power on is described.



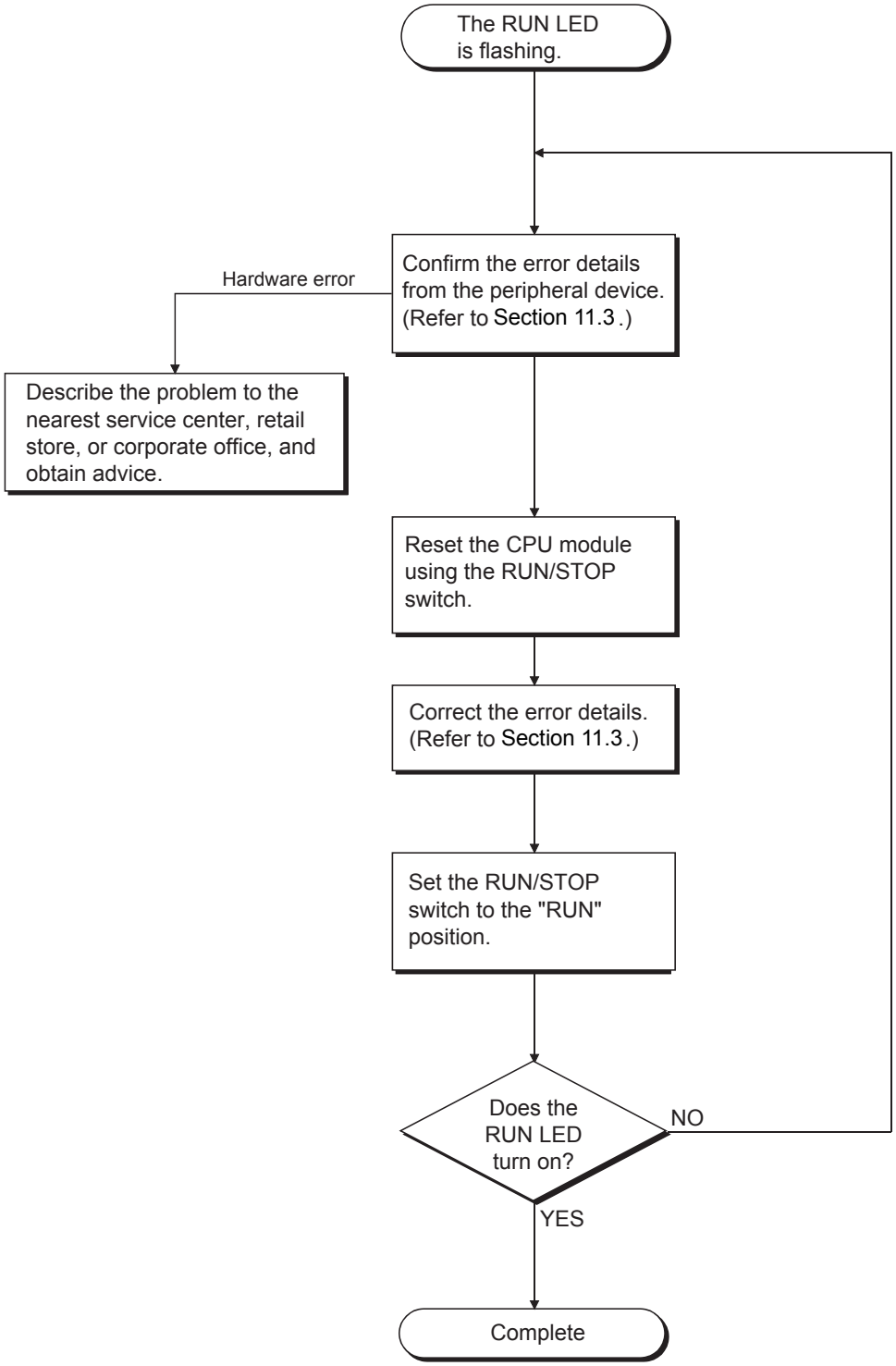
11.2.4 Flow for actions when the RUN LED is turned off

The corrective action when the RUN LED turns off during operation is described.


The RUN LED turned off.
Is there an error display when the peripheral device is connected?
YES
Perform the correction using the error detail list.
NO
Reset the CPU module using the RUN/STOP switch.
RUN LED turns on
(1) Part error or bad connection of Programmable controller.
(2) Caused by excessive noise.
RUN LED turns off
For (1)
For (2)
Set the CPU module RUN/STOP switch to the "STOP" position, and write END to the address 0 of the peripheral device.
Describe the problem to the nearest service center, retail store, or corporate office, and obtain advice.
Set the RUN/STOP switch to the "RUN" position and operate by setting the system to the monitor mode with the peripheral device.
RUN LED does not turn on
RUN LED turns on
Possibility of error in the sequence program.
Check the program, and correct the errors in the program.
Connect a surge suppression circuit such as a CR to the noise source.

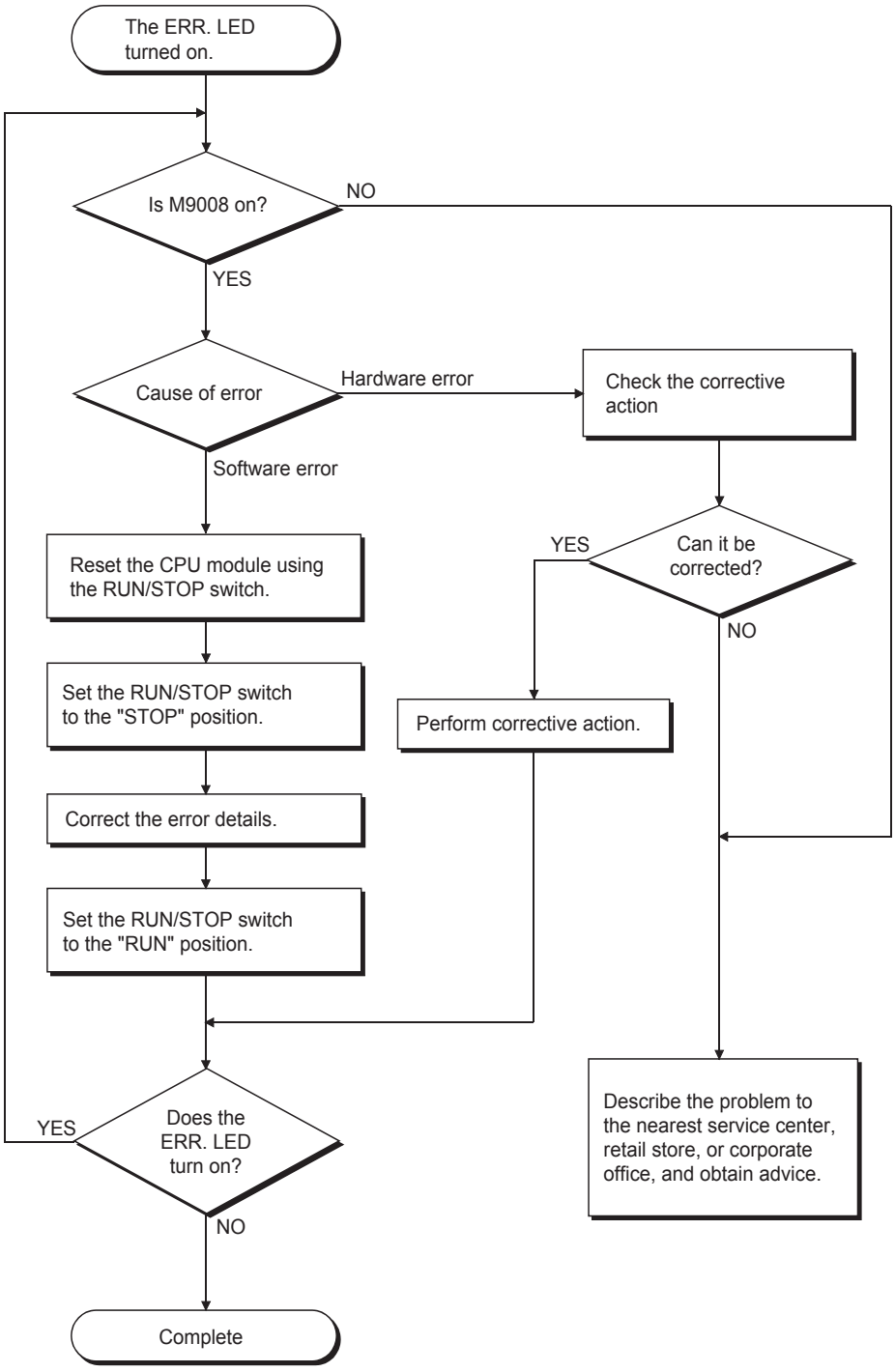
11.2.5 Flow for actions when the RUN LED is flashing

The corrective action when the RUN LED is flashing during power on, start of the operation, or during operation is described.


The RUN LED is flashing.
Confirm the error details from the peripheral device. (Refer to Section 11.3.)
Hardware error
Describe the problem to the nearest service center, retail store, or corporate office, and obtain advice.
Reset the CPU module using the RUN/STOP switch.
Correct the error details. (Refer to Section 11.3.)
Set the RUN/STOP switch to the "RUN" position.
Does the RUN LED turn on?
NO
YES
Complete

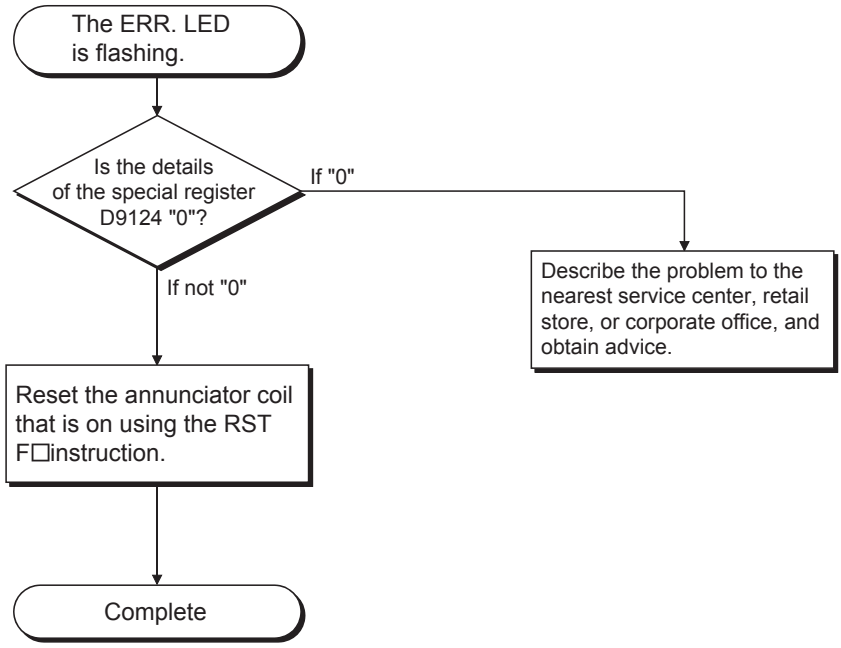
11.2.6 Flow for actions when the ERR. LED is turned on

The flow when the ERR. LED turns on during operation is described.


The ERR. LED turned on.
Is M9008 on?
NO
YES
Cause of error
Hardware error
Check the corrective action
Software error
YES
Can it be corrected?
NO
Reset the CPU module using the RUN/STOP switch.
Set the RUN/STOP switch to the "STOP" position.
Perform corrective action.
Correct the error details.
Set the RUN/STOP switch to the "RUN" position.
Describe the problem to the nearest service center, retail store, or corporate office, and obtain advice.
YES
Does the ERR. LED turn on?
NO
Complete

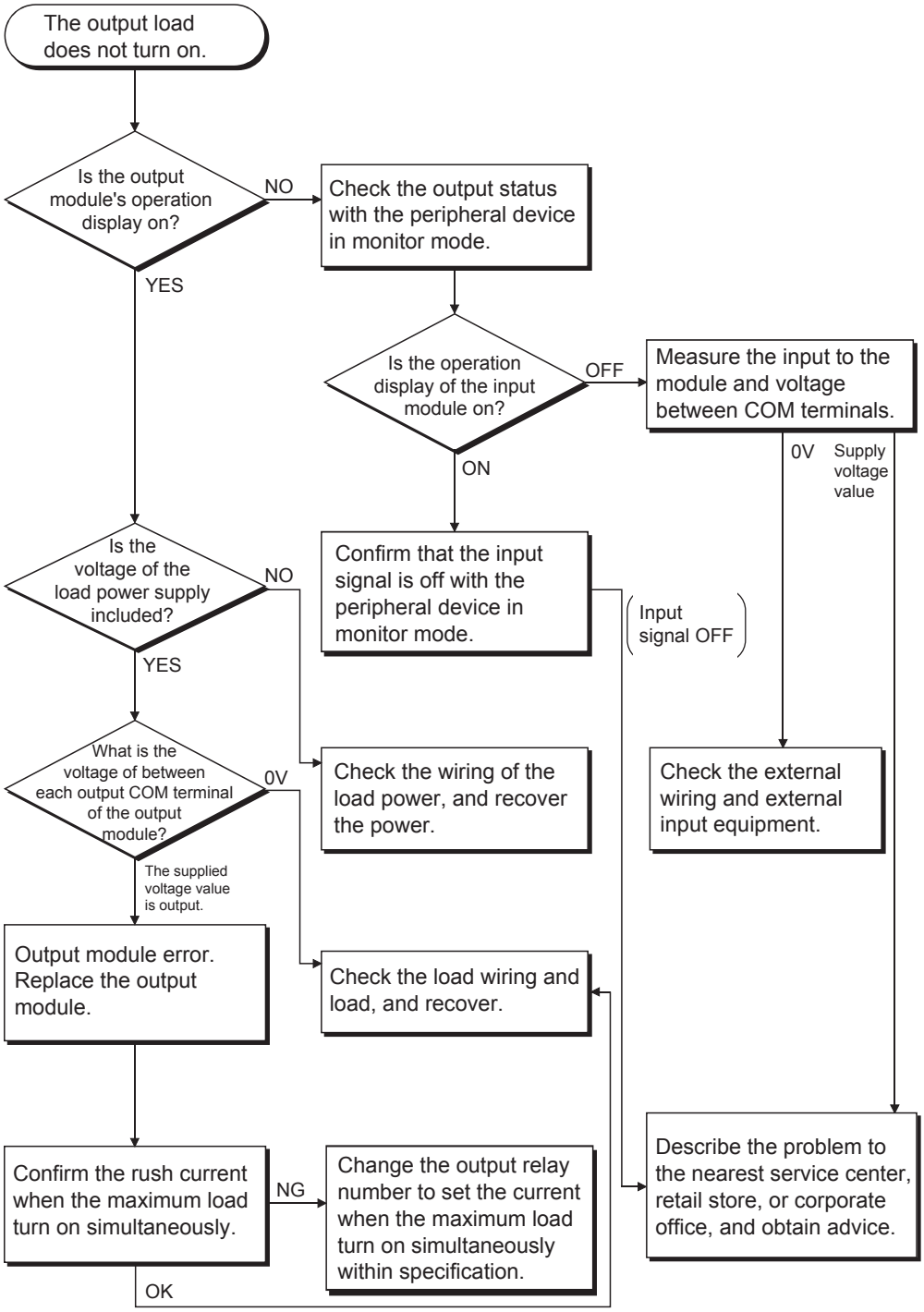
11.2.7 Flow for actions when the ERR. LED is flashing

The flow when the ERR. LED is flashing during operation is described.


The ERR. LED is flashing.
Is the details of the special register D9124 "0"?
If "0"
Describe the problem to the nearest service center, retail store, or corporate office, and obtain advice.
If not "0"
Reset the annunciator coil that is on using the RST F□instruction.
Complete

11.2.8 Flow for actions when the output module's output load does not turn on

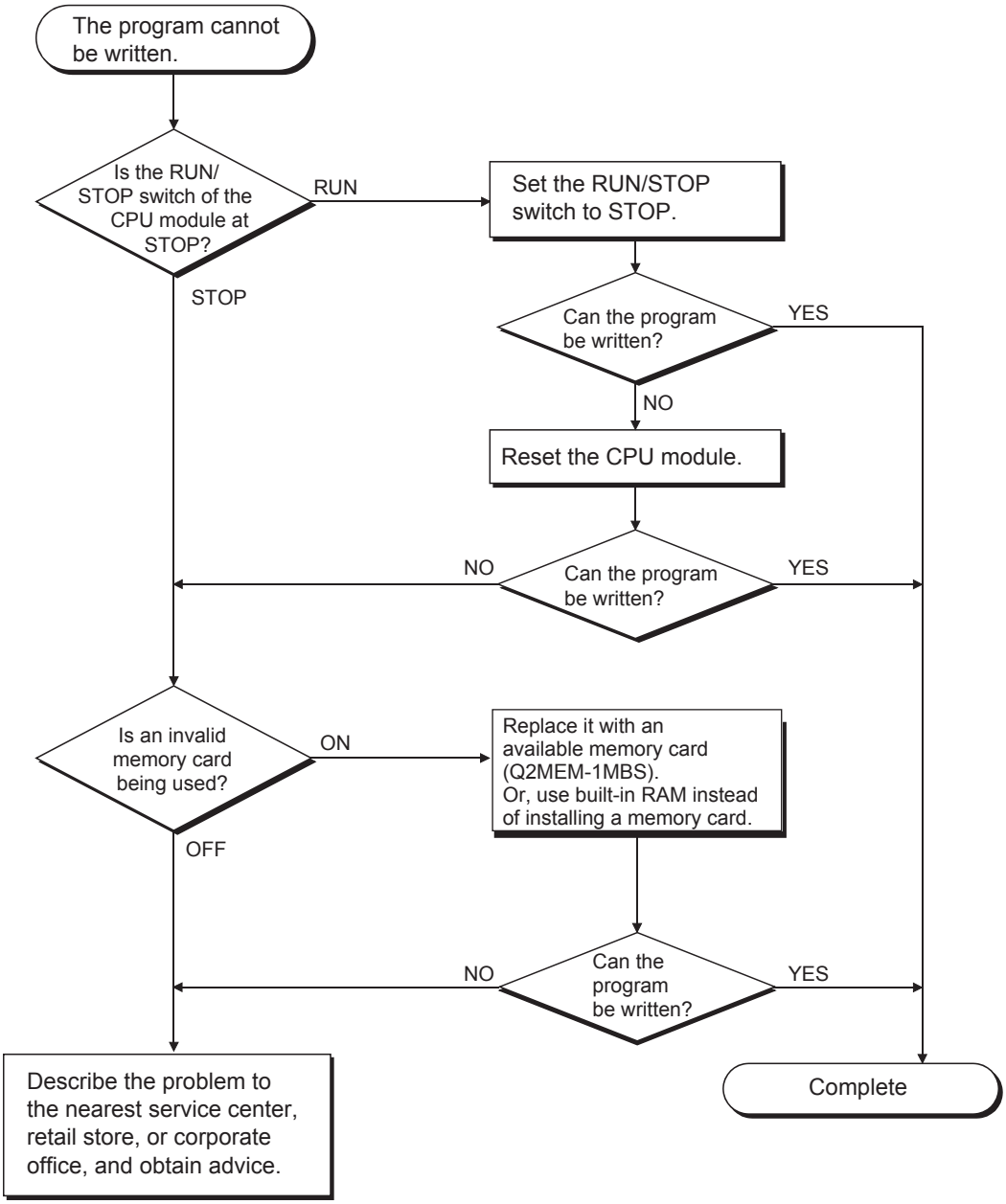
The corrective action when the output load of the output module does not turn on during operation is described.


The output load does not turn on.
Is the output module's operation display on?
NO
Check the output status with the peripheral device in monitor mode.
YES
Is the operation display of the input module on?
OFF
Measure the input to the module and voltage between COM terminals.
0V
Supply voltage value
ON
Is the voltage of the load power supply included?
NO
Confirm that the input signal is off with the peripheral device in monitor mode.
Input signal OFF
YES
What is the voltage of between each output COM terminal of the output module?
0V
Check the wiring of the load power, and recover the power.
Check the external wiring and external input equipment.
The supplied voltage value is output.
Output module error. Replace the output module.
Check the load wiring and load, and recover.
Confirm the rush current when the maximum load turn on simultaneously.
NG
Change the output relay number to set the current when the maximum load turn on simultaneously within specification.
Describe the problem to the nearest service center, retail store, or corporate office, and obtain advice.
OK

POINT
For problems when the input signal does not turn off and load does not turn off, perform troubleshooting by referring to the fault examples for the I/O module in Section 11.4.

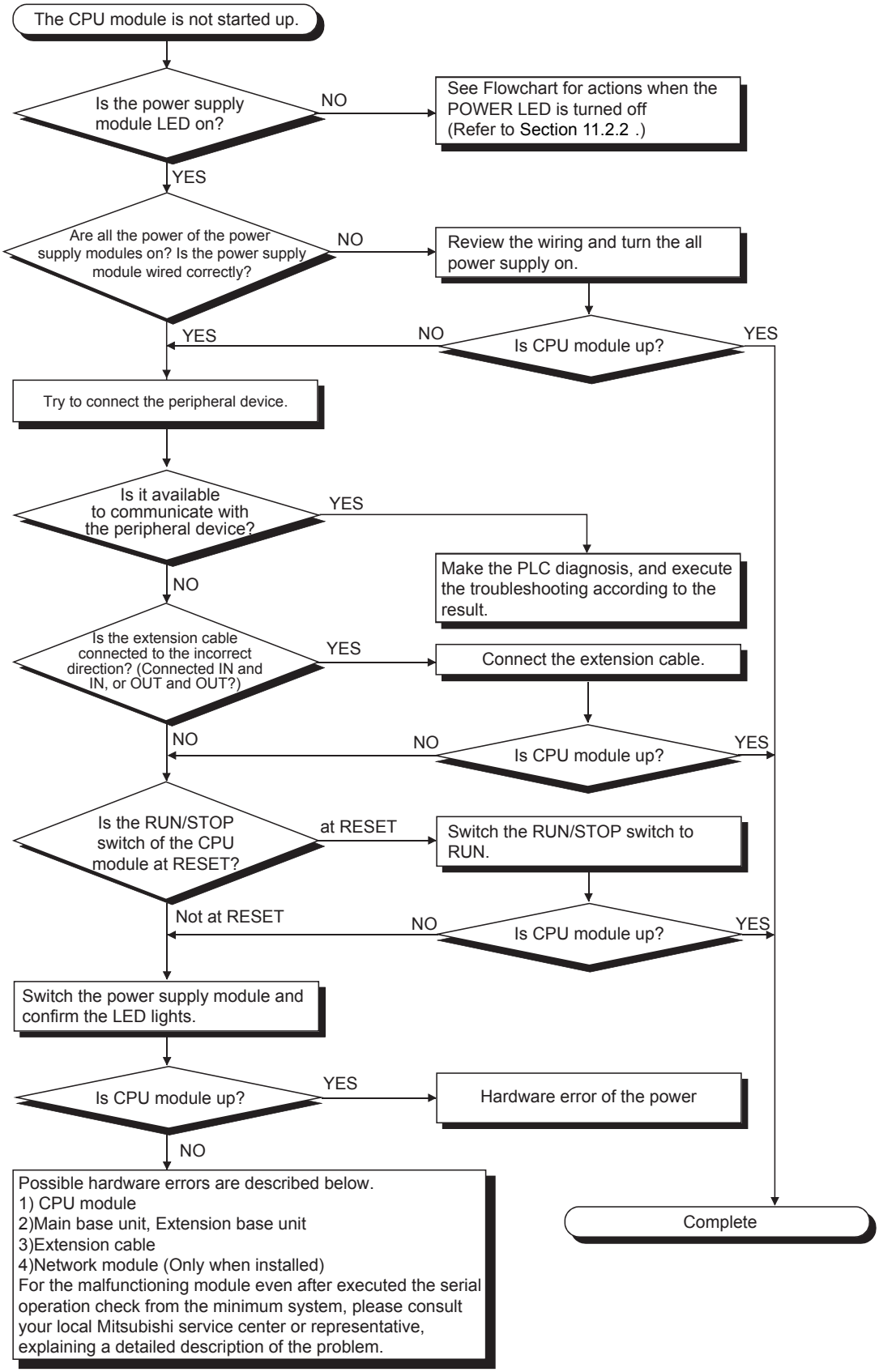
11.2.9 Flow for actions when the program cannot be written

The flowchart when the program and other data cannot be written to the CPU module is described.


The program cannot be written.
Is the RUN/ STOP switch of the CPU module at STOP?
RUN
Set the RUN/STOP switch to STOP.
STOP
Can the program be written?
YES
NO
Reset the CPU module.
NO
Can the program be written?
YES
Is an invalid memory card being used?
ON
Replace it with an available memory card (Q2MEM-1MBS). Or, use built-in RAM instead of installing a memory card.
OFF
NO
Can the program be written?
YES
Describe the problem to the nearest service center, retail store, or corporate office, and obtain advice.
Complete

11.2.10 Flow for actions when the CPU module is not started up

The following shows the flow when the CPU module is not started up.


The CPU module is not started up.
Is the power supply module LED on?
NO
See Flowchart for actions when the POWER LED is turned off (Refer to Section 11.2.2 .)
YES
Are all the power of the power supply modules on? Is the power supply module wired correctly?
NO
Review the wiring and turn the all power supply on.
Is CPU module up?
NO
YES
YES
Try to connect the peripheral device.
Is it available to communicate with the peripheral device?
YES
Make the PLC diagnosis, and execute the troubleshooting according to the result.
NO
Is the extension cable connected to the incorrect direction? (Connected IN and IN, or OUT and OUT?)
YES
Connect the extension cable.
Is CPU module up?
NO
NO
YES
Is the RUN/STOP switch of the CPU module at RESET?
at RESET
Switch the RUN/STOP switch to RUN.
Is CPU module up?
Not at RESET
NO
YES
Switch the power supply module and confirm the LED lights.
Is CPU module up?
YES
Hardware error of the power
NO
Possible hardware errors are described below.
1) CPU module
2)Main base unit, Extension base unit
3)Extension cable
4)Network module (Only when installed)
For the malfunctioning module even after executed the serial operation check from the minimum system, please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.
Complete

11.3 Error Code List

When an error occurs while the programmable controller is running or during RUN, error is displayed, or error code, detailed error code and error step are stored to special registers, D9008, D9091 and D9010, respectively, by the self-diagnostics function. Error definitions and corrective actions are shown below.

11.3.1 Procedure to read an error code

When an error occurs, the error code can be read with a peripheral device.
Refer to the Operating Manuals of the peripheral device for operation method.

11.3.2 Error code list for the QCPU-A (A Mode)

The following shows meanings and causes of error message, error codes, detailed error codes and corrective actions.

Table 11.1 Error Code List for QCPU-A (A Mode)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"INSTRCT CODE ERR" (Checked when STOP → RUN or at execution of instruction.)	10	101	STOP	Instruction codes which the CPU module cannot decode are included in the program.	(1) Read the error step using a peripheral device and correct the program of the step. (2) Check the ROM if it contains instruction codes which cannot be decoded. If it does, replace it with a correct ROM.
		102		Index qualification is specified for a 32-bit constant.	Read the error step using a peripheral device and correct the program of the step.
		103		Device specified by a dedicated instruction is not correct.	
		104		A dedicated instruction has incorrect program structure.	
		105		A dedicated instruction has incorrect command name.	
		106		Index qualification using Z or V is included in the program between LEDA/B IX and LEDA/B IXEND.	
		107		(1) Index qualification is specified for the device numbers and set values in the OUT instruction of timers and counters. (2) Index qualification is specified at the label number of the pointer (P) provided to the head of destination of the CJ, SCJ, CALL, CALLP, JMP, LEDA/B FCALL and LEDA/B BREAK instructions or at the label number of the interrupt pointer (I) provided to the head of an interrupt program.	
		108		Errors other than 101 to 107 mentioned above.	
"PARAMETER ERROR" (Checked at power on and at STOP/ PAUSE → RUN.)	11	111	STOP	Capacity settings of the main and sub programs, microcomputer program, file register comments, status latch, sampling trace and extension file registers are not within the usable range of the CPU.	Read parameters in the CPU memory, check the contents, make necessary corrections and write them again to the memory.
		112		Total of the set capacity of the main and sub programs, file register comments, status latch, sampling trace and extension file registers exceeds capacity of the memory cassette.	
		113		Latch range set by parameters or setting of M, L or S is incorrect.	
		114		Sum check error	

Table 11.1 Error Code List for QCPU-A (A Mode) (continued)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"PARAMETER ERROR" (Checked at power on and at STOP/PAUSE → RUN.)	11	115	STOP	Either of settings of the remote RUN/ PAUSE contact point by parameters, operation mode at occurrence of error, annunciator indication mode, or STOP → RUN indication mode is incorrect.	Read parameters in the CPU memory, check the contents, make necessary corrections and write them again to the memory.
		116		The MNET-MINI automatic refresh setting by parameters is incorrect.	
		117		Timer setting by parameters is incorrect.	
		118		Counter setting by parameters is incorrect.	
"MISSING END INS" (Checked at STOP → RUN.)	12	121	STOP	The END (FEND) instruction is not given in the main program.	Write the END instruction at the end of the main program.
		122		The END (FEND) instruction is not given in the sub program if the sub program is set by parameters.	Write the END instruction at the end of the sub program.
"CAN'T EXECUTE (P)" (Checked at execution of instruction.)	13	131	STOP	The same device number is used at two or more steps for the pointers (P) and interrupt pointers (I) used as labels to be specified at the head of jump destination.	Eliminate the same pointer numbers provided at the head of jump destination.
		132		Label of the pointer (P) specified in the CJ, SCJ, CALL, CALLP, JMP, LEDA/BFCALL or LEDA/BBREAK instruction is not provided before the END instruction.	Read the error step using a peripheral device, check contents and insert a jump destination pointer (P).
		133		(1) The RET instruction was included in the program and executed though the CALL instruction was not given. (2) The NEXT and LEDA/BBREAK instructions were included in the program and executed though the FOR instruction was not given. (3) Nesting level of the CALL, CALLP and FOR instructions is 6 levels or deeper, and the 6th level was executed. (4) There is no RET or NEXT instruction at execution of the CALL or FOR instruction.	(1) Read the error step using a peripheral device, check contents and correct program of the step. (2) Reduce the number of nesting levels of the CALL, CALLP and FOR instructions to 5 or less.
		134		The CHG instruction was included in the program and executed though no sub program was provided.	Read the error step using a peripheral device and delete the CHG instruction circuit block.
		135		(1) LEDA/BIX and LEDA/BIXEND instructions are not paired. (2) There are 33 or more sets of LEDA/BIX and LEDA/BIXEND instructions.	(1) Read the error step using a peripheral device, check contents and correct program of the step. (2) Reduce the number of sets of LEDA/BIX and LEDA/BIXEND instructions to 32 or less.

Table 11.1 Error Code List for QCPU-A (A Mode) (continued)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CHK FORMAT ERR" (Checked at STOP/PAUSE → RUN.)	14	141	STOP	Instructions (including NOP) other than LDX, LDIX, ANDX and ANIX are included in the CHK instruction circuit block.	Check the program of the CHK instruction and correct it referring to contents of detailed error codes.
		142		Multiple CHK instructions are given.	
		143		The number of contact points in the CHK instruction circuit block exceeds 150.	
		144		The LEDA CHK instructions are not paired with the LEDA CHKEND instructions, or 2 or more pairs of them are given.	
		145		Format of the block shown below, which is provided before the CHK instruction circuit block, is not as specified. P254 CHK D1 D2	
		146		Device number of D1 in the CHK D1 D2 instruction is different from that of the contact point before the CJ P instruction.	
		147		Index qualification is used in the check pattern circuit.	
		148		(1) Multiple check pattern circuits of the LEDA CHK - LEDA CHKEND instructions are given. (2) There are 7 or more check condition circuits in the LEDA CHK - LEDA CHKEND instructions. (3) The check condition circuits in the LEDA CHK - LEDA CHKEND instructions are written without using X and Y contact instructions or compare instructions. (4) The check pattern circuits of the LEDA CHK - LEDA CHKEND instructions are written with 257 or more steps.	
"CAN'T EXECUTE (I)" (Checked at occurrence of interrupt.)	15	151	STOP	The IRET instruction was given outside of the interrupt program and was executed.	Read the error step using a peripheral device and delete the IRET instruction.
		152		There is no IRET instruction in the interrupt program.	Check the interrupt program if the IRET instruction is given in it. Write the IRET instruction if it is not given.
		153		Though an interrupt module is used, no interrupt pointer (I) which corresponds to the module is given in the program. Upon occurrence of error, the problem pointer (I) number is stored at D9011.	Monitor special register D9011 using a peripheral device, and check if the interrupt program that corresponds to the stored data is provided or if two or more interrupt pointers (I) of the same number are given. Make necessary corrections.
"CASSETTE ERROR"	16	—	STOP	(1) A memory card is inserted or removed while the CPU module is ON. (2) An invalid memory card is inserted.	(1) Do not insert or remove a memory card while the CPU module is ON. (2) Insert an available memory card.

Table 11.1 Error Code List for QCPU-A (A Mode) (continued)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"RAM ERROR" (Checked at power on.)	20	201	STOP	The sequence program storage RAM in the CPU module caused an error.	Since this is CPU hardware error, consult Mitsubishi representative.
		202		The work area RAM in the CPU module caused an error.	
		203		The device memory in the CPU module caused an error.	
		204		The address RAM in the CPU module caused an error.	
"OPE CIRCUIT ERROR" (Checked at power on.)	21	211	STOP	The operation circuit for index qualification in the CPU does not work correctly.	Since this is CPU hardware error, consult Mitsubishi representative.
		212		Hardware (logic) in the CPU does not operate correctly.	
		213		The operation circuit for sequential processing in the CPU does not operate correctly.	
"OPE. CIRCUIT ERR." (Checked at execution of the END instruction.)		214		In the END processing check, the operation circuit for index qualification in the CPU does not work correctly.	
		215		In the END processing check, the hardware in the CPU does not operate correctly.	
"WDT ERROR" (Checked at execution of END processing.)	22	—	STOP	Scan time is longer than the WDT time. (1) Scan time of the user's program has been extended due to certain conditions. (2) Scan time has been extended due to momentary power failure occurred during scanning.	(1) Check the scan time of the user's program and shorten it using the CJ instructions. (2) Monitor contents of special register D9005 using a peripheral device. If the contents are other than 0, power supply voltage may not be stable. Check power supply and reduce variation in voltage.
"END NOT EXECUTE" (Checked at execution of the END instruction.)	24	241	STOP	Whole program of specified program capacity was executed without executing the END instructions. (1) When the END instruction was to be executed, the instruction was read as other instruction code due to noise. (2) The END instruction changed to other instruction code due to unknown cause.	(1) Reset and run the CPU again. If the same error recurs, Since this is CPU hardware error, consult Mitsubishi representative.
"MAIN CPU DOWN"	26	—	STOP	The main CPU is malfunctioning or faulty.	Since this is CPU hardware error, consult Mitsubishi representative.
"UNIT VERIFY ERR" (Checked continuously.)	31	—	Stop or Continue (set by parameter)	Current I/O module information is different from that recognized when the power was turned on. (1) The I/O module (including special function modules) connection became loose or the module was disconnected during operation, or wrong module was connected.	Read detailed error code using a peripheral device and check or replace the module which corresponds to the data (I/O head number). Or, monitor special registers D9116 to D9123 using a peripheral device and check or replace the modules if corresponding data bit is "1".

Table 11.1 Error Code List for QCPU-A (A Mode) (continued)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"FUSE BREAK OFF" (Checked continuously.)	32	—	Stop or Continue (set by parameter)	(1) There is an output module of which fuse is blown. (2) The external power supply for output load is turned off or is not connected.	(1) Check the FUSE BLOWN indicator LED on the output module and replace the fuse. (2) Read detailed error code using a peripheral device and replace the fuse of the output module which corresponds to the data (I/O head number). Or, monitor special registers D9100 to D9107 using a peripheral device and replace the fuse of the output module of which corresponding data bit is "1". (3) Check the on/off status of the external power supply for output load.
"CONTROL-BUS ERR"	40	401	STOP	Due to the error of the control bus which connects to special function modules, the FROM / TO instruction cannot be executed.	Since it is a hardware error of special function module, CPU module or base module, replace and check defective module(s). Consult Mitsubishi representative for defective modules.
		402		If parameter I/O assignment is being executed, special function modules are not accessible at initial communication. At error occurrence, the head I/O number (upper 2 digits of 3 digits) of the special function module that caused error is stored at D9010.	
		403		Hardware failure.	
		405		(1) The expansion cable is not properly connected. (2) QA1S base failure. The base information is different from that obtained at power on. The failed base is stored in D9068 as a bit pattern. The failed base is stored in D9010 from the upper stage.	(1) Connect the expansion cable properly. (2) The hardware failure occurs in the special function, CPU, or base module. Replace the module and find the faulty one. Describe the problem to the nearest system service, retail store, or corporate office, and obtain advice.
"SP.UNIT DOWN"	41	411	STOP	Though an access was made to a special function module at execution of the FROM / TO instruction no response is received.	Since it is hardware error of the special function module to which an access was made, consult Mitsubishi representative.
		412		If parameter I/O assignment is being executed, no response is received from a special function module at initial communication. At error occurrence, the head I/O number (upper 2 digits of 3 digits) of the special function module that caused error is stored at D9011.	
"LINK UNIT ERROR"	42	—	Continue	Two of data link module is specified as master stations.	Specify one of data link module as a master station and another as a local station.
"I/O INT. ERROR"	43	—	STOP	Though the interrupt module is not loaded, an interrupt occurred.	Since it is hardware error of a module, replace and check a defective module. For defective modules, consult Mitsubishi representative.

Table 11.1 Error Code List for QCPU-A (A Mode) (continued)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"SP.UNIT LAY.ERR."	44	441	STOP	A special function module is assigned as an I/O module, or vice versa, in the I/O assignment using parameters from the peripheral device.	Execute I/O assignment again using parameters from the peripheral device according to the loading status of special function modules.
		442		There are 9 or more special function modules (except the interrupt module) which can execute interruption to the CPU module loaded.	Reduce the special function modules (except the interrupt module) which can execute interrupt start to 8 or less.
		443		There are 2 or more data link modules loaded.	Reduce the data link modules to 1 or less.
		444		There are 7 or more modules such as a computer link module loaded to one CPU module.	Reduce the computer link modules to 6 or less.
		445		There are 2 or more interrupt modules loaded.	Reduce the interrupt modules to 1.
		446		Modules assigned by parameters for MNT/MINI automatic refresh from the peripheral device do not conform with the types of station modules actually linked.	Perform again module assignment for MNT/MINI automatic refresh with parameters according to actually linked station modules.
		447		The number of modules of I/O assignment registration (number of loaded modules) per one CPU module for the special function modules which can use dedicated instructions is larger than the specified limit. (Total of the number of computers shown below is larger than 1344.) (A1SJ71C24-R2(PRF/R4) × 10) (A1SJ71UC24 × 10) (A1SJ71PT32-S3 × 125) + (A1SJ71PT32(S3) * × 125) Total > 1344	Reduce the number of loaded special function modules. *Available when the extension mode is used.
		448		(1) Five or more network modules have been installed. (2) A total of five or more of network modules and data link modules have been installed.	(1) Reduce the number to four or less. (2) Reduce the total number to four or less.
		449		An invalid base module is used. Failure of base module hardware.	Use an available base module. Replace the failed base module.
"SP.UNIT ERROR" (Checked at execution of the FROM/TO instruction or the dedicated instructions for special function modules.)	46	461	Stop or Continue (set by parameter)	Module specified by the FROM / TO instruction is not a special function module.	Read the error step using a peripheral device and check and correct contents of the FROM / TO instruction of the step.
		462		(1) Module specified by the dedicated instruction for special function module is not a special function module or not a corresponding special function module. (2) A command was issued to a CC-Link module with function version under B. (3) A CC-Link dedicated command was issued to a CC-Link module for which the network parameters have not been set.	(1) Read the error step using a peripheral device and check and correct contents of the dedicated instruction for special function modules of the step. (2) Replace with a CC-Link module having function version B and above. (3) Set the parameters.

Table 11.1 Error Code List for QCPU-A (A Mode) (continued)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"LINK PARA. ERROR"	47	0	Stop or Continue (set by parameter)	[When using MELSECNET/(II)] (1) When the link range at a data link CPU which is also a master station (station number = 00) is set by parameter setting at a peripheral device, for some reason the data written to the link parameter area differs from the link parameter data read by the CPU. Alternatively, no link parameters have been written. (2) The total number of slave stations is set at 0. (3) The head I/O number of the network parameters is incorrect.	(1) Write the parameters again and check. (2) Check the station number settings. (3) Check the head I/O number of the network parameters. (4) Persistent error occurrence may indicate a hardware fault. Consult your nearest Mitsubishi representative, explaining the nature of the problem.
		470		[When using MELSECNET/10] (1) The contents of the network refresh parameters written from a peripheral device differ from the actual system at the base unit. (2) The network refresh parameters have not been written. (3) The head I/O number of the network parameters is incorrect.	Write the network refresh parameters again and check.
		471		[When using MELSECNET/10] (1) The transfer source device range and transfer destination device range specified for the inter-network transfer parameters are in the same network. (2) The specified range of transfer source devices or transfer destination devices for the inter-network transfer parameters spans two or more networks. (3) The specified range of transfer source devices or transfer destination devices for the inter-network transfer parameters is not used by the network.	
		472		[When using MELSECNET/10] The contents of the routing parameters written from a peripheral device differ from the actual network system.	
		473		[When using MELSECNET/10] (1) The contents of the network parameters for the first link unit, written from a peripheral device, differ from the actual network system. (2) The link parameters for the first link unit have not been written. (3) The setting for the total number of stations is 0.	(1) Write the parameters again and check. (2) Check the station number settings. (3) Persistent error occurrence may indicate a hardware fault. Consult your nearest Mitsubishi representative, explaining the nature of the problem.

Table 11.1 Error Code List for QCPU-A (A Mode) (continued)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"LINK PARA. ERROR"	47	474	Stop or Continue (set by parameter)	[When using MELSECNET/10] (1) The contents of the network parameters for the second link unit, written from a peripheral device, differ from the actual network system. (2) The link parameters for the second link unit have not been written. (3) The setting for the total number of stations is 0.	(1) Write the parameters again and check. (2) Check the station number settings. (3) Persistent error occurrence may indicate a hardware fault. Consult your nearest Mitsubishi representative, explaining the nature of the problem.
		475		[When using MELSECNET/10] (1) The contents of the network parameters for the third link unit, written from a peripheral device, differ from the actual network system. (2) The link parameters for the third link unit have not been written. (3) The setting for the total number of stations is 0.	(1) Write the parameters again and check. (2) Check the station number settings. (3) Persistent error occurrence may indicate a hardware fault. Consult your nearest Mitsubishi representative, explaining the nature of the problem.
		476		[When using MELSECNET/10] (1) The contents of the network parameters for the fourth link unit, written from a peripheral device, differ from the actual network system. (2) The link parameters for the fourth link unit have not been written. (3) The setting for the total number of stations is 0.	
		477		A link parameter error was detected by the CC-Link module.	
"OPERATION ERROR"	50	501	Stop or Continue (set by parameter)	(1) When file registers (R) are used, operation is executed outside of specified ranges of device numbers and block numbers of file registers (R). (2) File registers are used in the program without setting capacity of file registers.	Read the error step using a peripheral device and check and correct program of the step.
		502		Combination of the devices specified by instruction is incorrect.	
		503		Stored data or constant of specified device is not in the unable range.	
		504		Set number of data to be handled is out of the unable range.	
		505		(1) Station number specified by the LEDA/BLRDP , LEDA/BLWTP , LRDP , LWTP instructions is not a local station. (2) Head I/O number specified by the LEDA/BRFRP , LEDA/BRTOP , RFRP , RTOP instructions is not of a remote station.	
(Checked at execution of instruction.)		506		Head I/O number specified by the LEDA/BRFRP , LEDA/BRFRP , RFRP , RTOP instructions is not of a special function module.	

Table 11.1 Error Code List for QCPU-A (A Mode) (continued)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"OPERATION ERROR" (Checked at execution of instruction.)	50	507	Stop or Continue (set by parameter)	(1) When the AD57(S1) or AD58 was executing instructions in divided processing mode, other instructions were executed to either of them. (2) When an AD57(S1) or AD58 was executing instructions in divided processing mode, other instructions were executed in divided mode to another AD57(S1) or AD58.	AD57 (S1) and AD58 cannot be used with QCPU-A. Review the program.
		508		A CC-Link dedicated command was issued to three or more CC-Link modules.	The CC-Link dedicated command can be issued only to two or less CC-Link modules.
		509		(1) An instruction which cannot be executed by remote terminal modules connected to the MNET/ MINI-S3 was executed to the modules. (2) Though there are 32 entries of FROM or TO instructions registered with a PRC instruction in the mailbox (memory area waiting for execution), another PRC instruction is executed to cause an overflow in the mail box (memory area waiting for execution). (3) The PIDCONT instruction was executed without executing the PIDINIT instruction. The PID57 instruction was executed without executing the PIDINIT or PIDCONT instruction. The program presently executed was specified by the ZCHG instruction. (4) The number of CC-Link dedicated command executed in one scan exceeded 10.	(1) Read the error step using a peripheral device and correct the program, meeting loaded conditions of remote terminal modules. (2) Use special register D9081 (number of empty entries in mailbox) or special relay M9081 (BUSY signal of mail box) to suppress registration or execution of the PRC instruction. (3) Correct the program specified by the ZCHG instruction to other. (4) Set the number of CC-Link dedicated commands executed in one scan to 10 or less.
"MAIN CPU DOWN"	60	—	STOP	(1) The CPU malfunctioned due to noise. (2) Hardware failure.	(1) Take proper countermeasures for noise. (2) Since it is hardware error, consult Mitsubishi representative.
	61				
	62			(1) The power supply module detected an incorrect power waveform. (2) Failure of the power module, CPU module, main base unit or expansion cable is detected.	(1) Correct the voltage waveform applied to the power supply module. (2) Replace the power module, CPU module, main base unit or expansion cable.
"BATTERY ERROR" (Checked at power on.)	70	—	Continue	(1) The battery voltage for the CPU module has dropped below the specified value. (2) The lead connector of the CPU module battery is disconnected. (M9006 is on.) (3) The battery voltage for the memory card has dropped below the specified value. (M9048 is on.)	(1) Replace the battery of the CPU module. (2) Connect the lead connector when using the built-in RAM or the memory retention function during power failure. (3) Replace the battery of the memory card.

11.4 Fault Examples with I/O Modules

Examples of faults concerning I/O circuits and the corrective actions are explained.

11.4.1 Faults with the input circuit and the corrective actions

Examples of faults concerning input circuits and the corrective actions are explained.

Table 11.2 Faults with the input circuit and the corrective actions

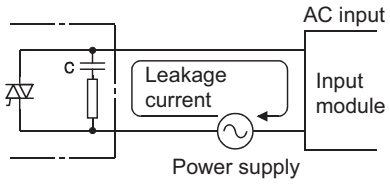
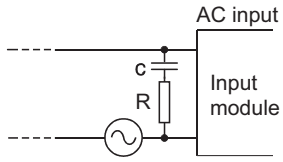
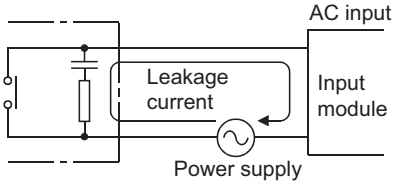
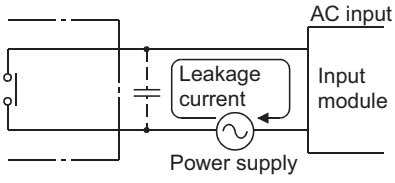
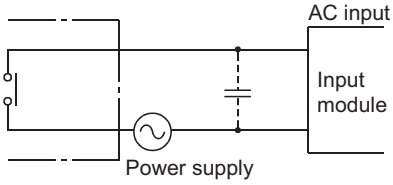
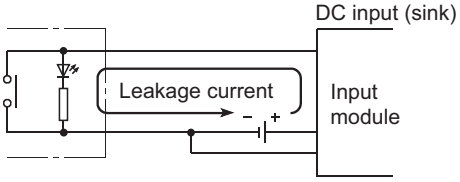
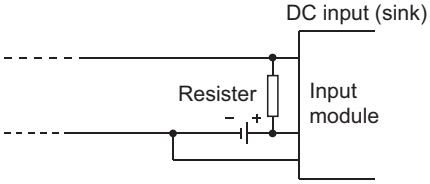
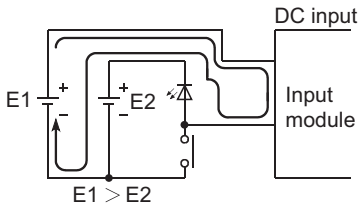
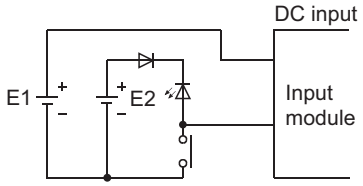
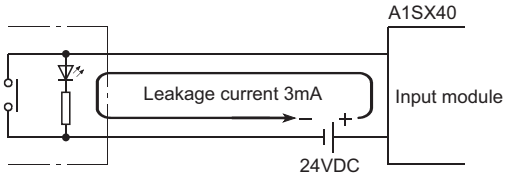
	Situation	Cause	Countermeasure
Example 1	Input signal does not turn off.	• Leak current from input switch (driven by a contactless switch, etc.) 	• Connect an appropriate resistor so that voltage between the terminals of the input module is lower than the OFF voltage.  For CR constant, 0.1 to 0.47μF+47 to 120Ω (1/2W) is recommended.
Example 2	Input signal does not turn off.	• Driven by a limit switch with a neon lamp 	• Same as the example 1. • Or, provide a totally independent display circuit separately.
Example 3	Input signal does not turn off.	• Line capacity C of the leak current twisted pair cable due to line capacity of the wiring cable is about 100PF/m. 	• Same as the example 1. • However, it does not occur when power supply is on the side of input device as shown below. 
Example 4	Input signal does not turn off.	• Driven by a switch with LED indication 	• Connect an appropriate resistance so that voltage between the terminal of the input module and the common is lower than the OFF voltage as shown below.  * An example of calculation of resistance to be connected is provided on the following page.

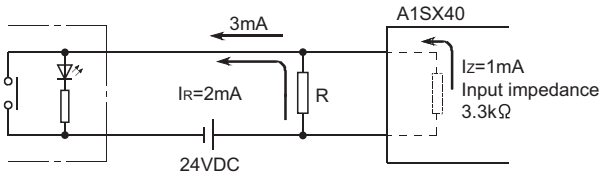
Table 11.2 Faults with the input circuit and the corrective actions (Continued)

	Situation	Cause	Countermeasure
Example 5	Input signal does not turn off.	• Sneak path due to the use of two power supplies. 	• Use only one power supply. • Connect a diode to prevent the sneak path (figure below). 

<Sample calculation for Example 4>
When a switch with LED indicator, giving leaking current of 3mA at maximum when 24VDC power is supplied to the A1SX40.



(1) 1mA or less OFF current of the A1SX40 is not satisfied. Hence, connect a resistor as shown below.



(2) Calculate the resistance value R as shown below.
To satisfy 1mA or less OFF current of the A1SX40, connect a resistor which flows 2mA or more.
$I_R : I_Z = Z(\text{Input impedance}) : R$

$$R < \frac{I_Z}{I_R} \times Z(\text{Input impedance}) = \frac{1.0}{2.0} \times 3.3 = 1.65[k\Omega]$$

Supposing that the resistance R is 1.5kΩ, the power capacity W of resistor R is:
$W = (\text{Input voltage})^2/R = 26.4^2/1500 = 0.465$ [W]

(3) Connect a resistor of 1.5(kΩ) and 2 to 3(W) to a terminal which may cause an error, since the power capacity of a resistor is selected so that it will be 3 to 5 times greater than the actual power consumption.

(4) Also, OFF voltage when resistor R is connected will be as follows.

$$\frac{1}{\frac{1}{1.5[k\Omega]} + \frac{1}{3.3[k\Omega]}} \times 3[mA] = 3.09[V]$$

• This satisfies 4V or less OFF voltage of A1SX40.

11.4.2 Faults in the output circuit

Faults concerning output circuits and the corrective actions are explained.

Table 11.3 Faults with the output circuit and the corrective actions

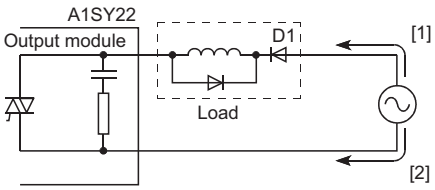
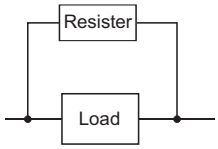
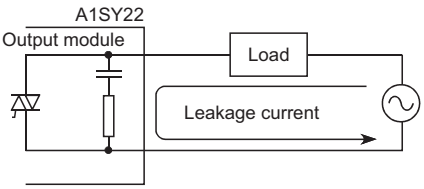
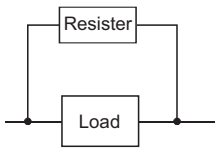
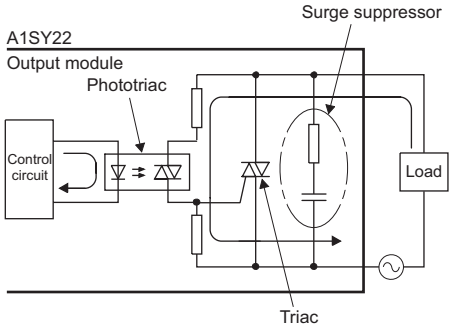
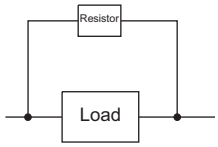
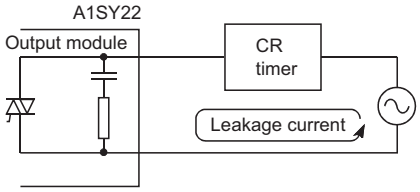
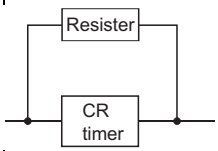
	Situation	Cause	Countermeasure
Example 1	An excessive voltage is applied to the load when output is off.	• When the load is subjected to half wave rectification inside (Solenoids have these types.)  • When the polarity of the power supply is [1], C is charged, and when the polarity is [2], the voltage charged in C + voltage of the power supply are applied to the both ends of D1. The maximum value of the voltage is about 2.2E.	• Connect a resistor with several tens to several hundreds of kΩ to the both ends of the load. (With this kind of usage, there is no problem with the output element, but the diode built-in to the load may deteriorate and burn-out.) 
Example 2	Load does not turn off. (Triac output)	• Leak current caused by built-in noise suppressor 	• Connect a resistor to the both ends of the load. (When the wiring distance from the output card to the load is long, be aware of the risk of a leak current due to line capacity.) 

Table 11.3 Faults with the output circuit and the corrective actions (continued)

<table>
<tr><th></th><th>Situation</th><th>Cause</th><th>Countermeasure</th></tr>
<tr><td>Example 3</td><td>The load is not turned off.
(Triac output)</td><td>• The load current is lower than the minimum load current.
 

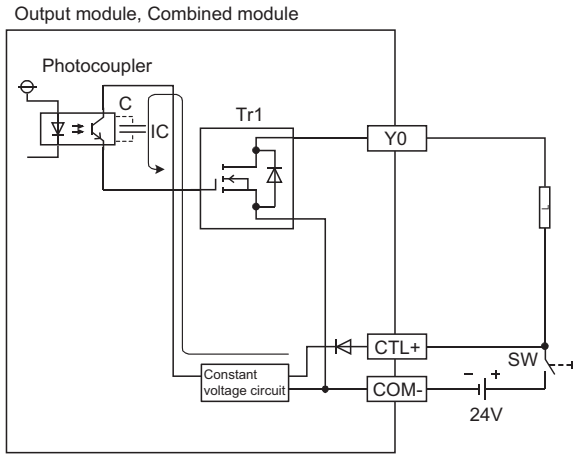
• When the load current is lower than the minimum load current of the output module, the triac does not operate since the load current flows into a photothiac as shown below. When an inductive load is connected, the load may not be turned off since the surge at the time of off is applied to the photothiac.</td><td>• Connect a resistor to both ends of a load so that the load current is higher than the minimum load current.
 
</td></tr>
<tr><td>Example 4</td><td>When load is CR type timer, the time limit fluctuates.
(Triac output)</td><td> 
</td><td>• Start the relay first, then start the CR-type timer at the contact.
(In some timers, internal circuit may be half wave rectification type, so the caution as to the example 1 is necessary here.)
 

Calculate the constant of the resistance based on the load.</td></tr>
</table>

Table 11.3 Faults with the output circuit and the corrective actions (continued)

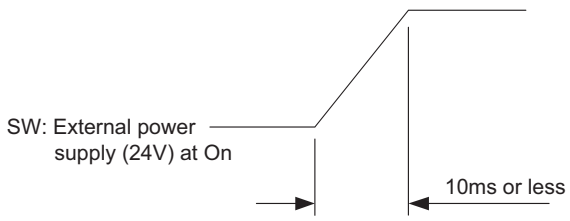
<table>
<tr><th></th><th>Situation</th><th>Cause</th><th>Countermeasure</th></tr>
<tr>
<td>Example 5</td>
<td>When the external power supply turns on, the load turns on for a moment.</td>
<td>
Erroneous output due to the stray capacitance (C) between collector and emitter of photocoupler.

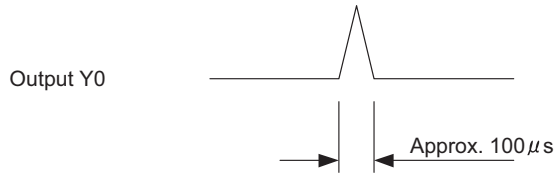
(There is no erroneous output at normal road.
An erroneous output may occur at high sensitivity load
(such as solid state relay).)



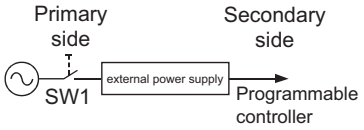
If the external power supply is turned on precipitously, Ic current flows due to the stray capacitance (C) between collector and emitter of photocoupler.

Ic current flows to the next stage of transistor Tr1 gate and Y0 output turns on by 100 μs

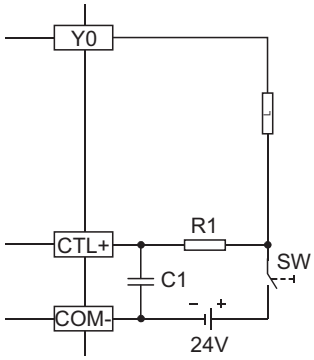




</td>
<td>
When turning on or off the external power, check that the external power supply rising edge must be 10ms or more, and switch the SW1 to the primary side of external power supply.



When switching to the secondary side of the external power supply is required, the external power supply rising edge connected a condenser must be slow, and measured 10ms or more.



R1: Several tens of ohms
Power capacity ≧
(external power supply current*1)^2
× resistance value × (3 to 5)*2

C1: Several hundreds of microfarads 50V

*1 Refer to consumption current of the external power supply for modules used in this manual.

*2 Select the power capacity of resistance to be 3 to 5 times lager than the actual power consumption.

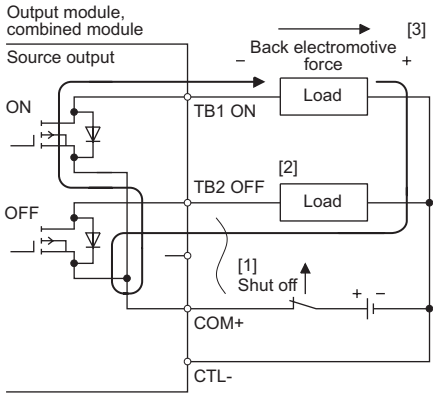
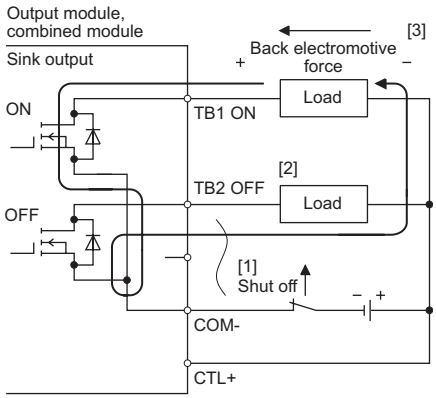
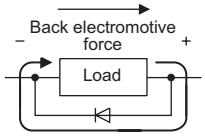
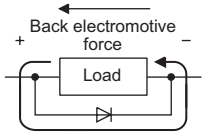
(Example)

R1=40 Ω , C1=300 μF

Use the below expression to calculated a time constant

C1 × R1=300 × 10^{-6} × 40
=12 × 10^{-3}s
=12ms
</td>
</tr>
</table>

Table 11.3 Faults with the output circuit and the corrective actions (continued)

	Situation	Cause	Countermeasure
Example 6	The load which was turned off is turned on for a moment at power-off. (Transistor output)	The load [2] which was turned off may be turned on due to back electromotive force at the time of power-off [1] if an inductive load is used.  	To prevent the generation of the back electromotive force, connect diode in parallel with load where the back electromotive force has been generated. Source output [3]  Sink output [3] 

APPENDICES

Appendix1 Instruction List

The instruction list to be used with a programmable controller is shown.
Refer to the following Programming Manuals for the details of the instructions.

• ACPU/QCPU-A (A Mode) Programming Manual (Fundamentals) • ACPU Programming Manual (Common Instructions) • AnSHCPU/AnACPU/AnUCPU/QCPU-A (A Mode) Programming Manual (Dedicated Instructions) • AnACPU/AnUCPU/QCPU-A (A Mode) Programming Manual (PID Control Instructions)	IB-66249 IB-66250 IB-66251 IB-66258

(1) Sequence instructions

(a) Contact instruction

Contact	LD, LDI, AND, ANI, OR, ORI

(b) Association command

Association	ANB, ORB, MPS, MRD, MPP

(c) Output instruction

Output	OUT, SET, RST, PLS, PLF

(d) Shift instruction

Shift	SFT, SFTP

(e) Master control instruction

Master control	MC, MCR

(f) End instruction

Program end	FEND, END

(g) Other instructions

STOP	STOP
No operation	NOP
Page break (Page break operation for printer output)	NOPLF

(2) Basic instructions

(a) Comparison instructions

=	16 bit	LD=, AND=, OR=
	32 bit	LDD=, ANDD=, ORD=
< >	16 bit	LD<>, AND<>, OR<>
	32 bit	LDD<>, ANDD<>, ORD<>
>	16 bit	LD>, AND>, OR>
	32 bit	LDD>, ANDD>, ORD>
≦	16 bit	LD<=, AND<=, OR<=
	32 bit	LDD<=, ANDD<=, ORD<=
<	16 bit	LD<, AND<, OR<
	32 bit	LDD<, ANDD<, ORD<
≧	16 bit	LD>=, AND>=, OR>=
	32 bit	LDD>=, ANDD>=, ORD>=

(b) BIN arithmetic operation instructions

+ Addition	16 bit	Two types each for +, +P
	32 bit	Two types each for D+, D+P
- Subtraction	16 bit	Two types each for -, - P
	32 bit	Two types each for D, D-P
* Multiplication	16 bit	*, * P
	32 bit	D *, D *P
/ Division	16 bit	/, /P
	32 bit	D/, D/P
+1 Addition	16 bit	INC, INCP
	32 bit	DINC, DINCP
-1 Subtraction	16 bit	DEC, DECP
	32 bit	DDEC, DDECP

(c) BCD arithmetic operation instructions

+ Addition	BCD 4-digit	Two types each for B+, B+P
	BCD 8-digit	Two types each for DB+, DB+P
- Subtraction	BCD 4-digit	Two types each for B-, B-P
	BCD 8-digit	Two types each for DB, DB-P
* Multiplication	BCD 4-digit	B *, B * P
	BCD 8-digit	DB *, DB *P
/ Division	BCD 4-digit	B/, B/P
	BCD 8-digit	DB/, DB/P

(d) BCD-BIN conversion instructions

BIN → BCD	16 bit	BCD, BCDP
	32 bit	DBCD, DBCDP
BCD → BIN	16 bit	BIN, BINP
	32 bit	DBIN, DBINP

(e) Data transfer instructions

Transfer	16 bit	MOV, MOVP
	32 bit	DMOV, DMOVP
Exchange	16 bit	XCH, XCHP
	32 bit	DXCH, DXCHP
Negation transfer	16 bit	CML, CMLP
	32 bit	DCML, DCMLP
Batch transfer	16 bit	BMOV, BMOVP
Same data batch transfer	16 bit	FMOV, FMOVP

(f) Program branch instructions

Jump	CJ, SCJ, JMP
Subroutine call	CALL, CALLP, RET
Interrupt program enable/disable	EI, DI, IRET

(g) Refresh instructions

Link refresh	COM
Link refresh enable/disable	EI, DI
Partial refresh	SEG

(3) Application instructions

(a) Logical operation instructions

Logical product	16 bit	Two types each for WAND, WANDP
	32 bit	DAND, DANDP
Logical sum	16 bit	Two types each for WOR, WORP
	32 bit	DOR, DORP
Exclusive logical sum	16 bit	Two types each for WXOR, WXORP
	32 bit	DXOR, DXORP
Not exclusive logical sum	16 bit	Two types each for WXNR, WXNRP
	32 bit	DXNR, DXNRP
Complements of 2 (sign highlights)	16 bit	NEG, NEGP

(b) Rotation instructions

Right rotation	16 bit	ROR, RORP, RCR, RCRP
	32 bit	DROR, DRORP, DRCR, DRCRP
Left rotation	16 bit	ROL, ROLP, RCL, RCLP
	32 bit	DROL, DROLP, DRCL, DRCLP

(c) Shift instructions

Right shift	16 bit	SFR, SFRP, BSFR, BSFRP
	Device unit	DSFR, DSFRP
Left shift	16 bit	SFL, SFLP, BSFL, BSFLP
	Device unit	DSFL, DSFLP

(d) Data processing instructions

Data search	16 bit	SER, SERP
Bit check	16 bit	SUM, SUMP
	32 bit	DSUM, DSUMP
Decode	2^n-bit	DECO, DECOP
	16 bit	SEG
Encode	2^n-bit	ENCO, ENCOP
Bit set	16 bit	BSET, BSETP
Bit reset	16 bit	BRST, BRSTP
Separation	16 bit	DIS, DISP
Association	16 bit	UNI, UNIP

(e) FIFO instructions

Write	16 bit	FIFW, FIFWP
Read	16 bit	FIFR, FIFRP

(f) ASCII instructions

ASCII conversion	ASC
ASCII print	PR (two types), PRC

(g) Buffer memory access instructions

Data read	1 word	FROM, FROMP
	2 word	DFRO, DFROP
Data write	1 word	TO, TOP
	2 words	DTO, DTOP

(h) FOR to NEXT instruction

Repeat	FOR, NEXT

(i) Display instructions

Display	LED, LEDC
Display reset	LEDR

(j) Data link module instructions

Data read	1 word	LRDP, RFRP
Data write	1 word	LWTP, RTOP

(k) Other instructions

WDT reset		WDT, WDTP
Error check		CHK
Status latch		SLT, SLTR
Sampling trace		STRA, STRAR
Carry flag set/reset	1 bit	STC, CLC
Timing clock	1 bit	DUTY

(4) Dedicated instructions

(a) Direct processing instructions

Direct output	DOUT
Direct set	DSET
Direct reset	DRST

(b) Structured program instructions

Circuit indexing	IX, IXEND
Repeat forced termination	BREAK
Subroutine call	FCALL
Error check circuit pattern change	CHK, CHKEND

(c) Data operation instructions

32-bit data search	DSER
16-bit upper/lower byte swap	SWAP
Data separation	DIS
Data association	UNI
Bit test	TEST, DTEST

(d) I/O operation instructions

Flip-flop control	FF
Numeral key input from keyboard	KEY

(e) Real value processing instructions (BCD format processing)

BCD 4-digit square root	BSQR
BCD 8-digit square root	BDSQR
SIN (sine) operation	BSIN
COS (cosine) operation	BCOS
TAN (tangent) operation	BTAN
SIN^{-1}(arcsine) operation	BASIN
COS^{-1} (arccosine) operation	BACOS
TAN^{-1} (arctangent) operation	BATAN

(f) Real value processing instructions (Floating point format real value processing)

Real number → 16/32-bit BIN conversion	INT, DINT
16/32-bit BIN → real number conversion	FLOAT, DFLOAT
Addition	ADD
Subtraction	SUB
Multiplication	MUL
Division	DIV
Degree → radian conversion	RAD
Radian → degree conversion	DEG
SIN (sine) operation	BSIN
COS (cosine) operation	BCOS
TAN (tangent) operation	BTAN
SIN^{-1}(arcsine) operation	BASIN
COS^{-1} (arccosine) operation	BACOS
TAN^{-1} (arctangent) operation	BATAN
Square root	SQR
Exponential	EXP
Logarithm	LOG

(g) Text string processing instructions

16/32-bit BIN → hexadecimal ASCII conversion	BINDA, DBINDA
16/32-bit BIN → hexadecimal ASCII conversion	BINHA, DBINHA
16/32-bit BCD → decimal ASCII conversion	BCDDA, DBCDDA
Hexadecimal ASCII → 10/32-bit BIN conversion	DABIN, DDABIN
Hexadecimal ASCII → 16/32-bit BIN conversion	HABIN, DHABIN
Decimal ASCII → 16/32-bit BCD conversion	DABCD, DDABCD
Device comment data read	COMRD
Text string length detection	LEN
16/32-bit BIN → decimal character string conversion	STR, DSTR
Decimal character string → 16/32-bit BIN conversion	VAL, DVAL
Hexadecimal data → ASCII conversion	ASC
ASCII → hexadecimal data conversion	HEX
Text string transfer	SMOV
Character string association	SADD
Character string comparison	SCMP
Separation in byte units	WTOB
Byte-unit data association	BTOW

(h) Data control instructions

Upper/lower limit control	LIMIT, DLIMIT
Dead zone control	BAND, DBAND
Zone control	ZONE, DZONE

(i) Clock instructions

Clock data read	DATERD
Clock data write	DATEWR

(j) Extension file register instructions

Extension file register block number conversion	RSET
Block transfer between extension file registers	BMOVR
Block exchange between extension file registers	BXCHR
Direct read of extension file register in 1 word unit	ZRRD
Direct read of extension file register in 1 byte unit	ZRRDB
Direct write of extension file register in 1 word unit	ZRWR
Direct write of extension file register in 1 byte unit	ZRWRB

(k) 1ms timer instruction

1ms timer set	ZHTIME

(l) Data link instructions

*1: New instructions set for exclusive use with AnUCPU

	Local station word device read	LRDP
	Local station word device write	LWTP
	Data read from remote I/O station special function module	RFRP
	Data write from remote I/O station special function module	RTOP
*1	Word device read from connected station	ZNRD
*1	Word device write to connected station	ZNWR
*1	Network refresh instruction	ZCOM

(m) AD61(S1) high-speed counter module control instructions
(The AD61 dedicated instructions cannot be executed on the A1SD61.)

Preset value data setting	PVWR1, PVWR2
Set data write for larger/smaller/matched judgement	SVWR1, SVWR2
Present value read from CH1/CH2	PVRD1, PVRD2

(n) AJ71C24(S8) computer link module control instructions

Data send	Characters up to the 00H code	PR
	Intended number of characters	PRN
Data receive		INPUT
Communication status read		SPBUSY
Communication processing forced interruption		SPCLR

(o) AJ71C21(S1) terminal interface module control instructions

Data output to RS-232C (data up to the 00H code)	PR2
Data output to RS-422 (data up to the 00H code)	PR4
Data output to RS-232C (for intended number of points)	PRN2
Data output to RS-422 (for intended number of points)	PRN4
Data read input from RS-232C	INPUT2
Data input from RS-422	INPUT4
Data read from RAM memory	GET
Data write to RAM memory	PUT
Communication status read	SPBUSY
Communication processing forced interruption	SPCLR

(p) MELSECNET/MINI-S3 master module control instructions

Key input from operation box	INPUT
Data send/receive for specified number of bytes to/ from AJ35PTF-R2	PR, PRN, INPUT
Data read/write for MINI standard protocol module	MINI
Error reset for remote terminal module	MINIERR
Communication status read	SPBUSY
Communication status forced interruption	SPCLR

(q) PID operation instructions

Control data setting	PIDINIT
PID operation	PIDCONT
PID operation result monitoring for AD57(S1)	PID57

(r) AD59(S1) memory card/centronics interface module control instructions

Output to printer	Characters up to the 00_H code	PR
	Intended number of characters	PRN
Data read to memory card		GET
Data write to memory card		PUT

(s) AD57(S1) control instructions

Display mode setting instruction		CMODE
Screen display control instructions	Canvas screen display	CPS1
	VRAM display address change	CPS2
	Canvas data transfer	CMOV
	Screen clear	CLS
	VRAM clear	CLV
	Scroll up/down	CSCRU, CSCRD
Cursor control instructions	Cursor display	CON1, CON2
	Cursor erase	COFF
	Cursor position setting	LOCATE
Display condition setting instructions	Forward/reverse rotation of characters to be displayed	CNOR, CREV
	Forward/reverse rotation of characters	CRDSP, CRDSPV
	Character color specification	COLOR
	Character color change	CCDSP, CCDSPV

(Continued to next page)

Specified character display instructions	ASCII character display	PR, PRN
	ASCII character write	PRV, PRNV
	Character display	EPR, EPRN
	Character write	EPRV, EPRNV
	Continuous display of same character	CR1, CR2, CC1, CC2
Fixed character display instructions	- (minus) display	CINMP
	- (hyphen) display	CINHP
	. (period, decimal point) display	CINPT
	Numeric character display	CIN0 to CIN9
	Alphanumeric character display	CINA to CINZ
	Space display	CINSP
Specified column clear instruction		CINCLR
Conversion instructions for displayed character string into ASCII code		INPUT
VRAM data control instructions	Data read	GET
	Data write	PUT
Display status read instruction		STAT

(t) CC-Link dedicated instructions

Network parameter setting	RLPA
Automatic refresh parameter setting	RRPA
Read from the auto refresh buffer memory of the intelligent device station	RIFR
Write to the auto refresh buffer memory of the intelligent device station	RITO
Read from the buffer memory of the intelligent device station	RIRD
Write to the buffer memory of the intelligent device station	RIWT
Write to the buffer memory of the intelligent device station (with handshake)	RISEND
Read from the buffer memory of the intelligent device station (with handshake)	RIRCV

Appendix1.1 Precautions for write during RUN of a dedicated instruction

Contents of Write during RUN	For LEDA	For LEDB
Write normal configuration during RUN	After writing, the instruction is executed with the previous contact on.	After writing, the instruction is executed when the previous contact is turned from off to on.
LEDA/LEDB was added by mistake.	Detailed error code, 104 is reported.	If the previous contact remains on after writing, no execution causes no processing and detailed error code 104 is reported when the previous contact is turned from off to on.
LEDA/LEDB was deleted by mistake.	LEDC/SUB/LEDR is handled as a normal instruction.	
LEDC/SUB was added by mistake.	Detailed error code, 104 is reported.	If the previous contact remains on after writing, no execution causes no processing and detailed error code 104 is reported when the previous contact is turned from off to on.
LEDC/SUB was deleted by mistake.	Detailed error code, 104 is reported.	If the previous contact remains on after writing, no execution causes no processing and detailed error code 104 is reported when the previous contact is turned from off to on.
LEDR was added by mistake.	LEDR in the back is handled as a normal instruction.	LEDR in the back is handled as a normal instruction.
LEDR was deleted by mistake.	If no LEDR exists immediately after the deleted LEDR, detailed error code 104 is reported.	If no LEDR exists immediately after the deleted LEDR, detailed error code 104 is reported. When the LEDR exists, all instructions found between them are not executed.

REMARK

The detailed error code 104 means that "the configuration of the program using dedicated CC-Link instructions is not correct." (Refer to Section 11.3.2)

Appendix2 Lists of Special Relays and Special Registers

Appendix2.1 Special relays

The special relays are the internal relays that have specific applications in the programmable controller. Therefore, do not turn on or off the special relay on the program. (Except for the ones marked by *1 or *2 in the table.)

Table App.2.1 Special Relay List

Number	Name	Description	Details	Applicable CPU	
*1 M9000	Fuse blown	OFF:Normal ON: Fuse blown unit	• Turned on when there is one or more output units of which fuse has been blown or external power supply has been turned off (only for small type). Remains on if normal status is restored. Output modules of remote I/O stations are also checked fore fuse condition.	○	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
*2 M9002	I/O unit verify error	OFF:Normal ON: Error	• Turned on if the status of I/O module is different from entered status when power is turned on. Remains on if normal status is restored. I/O module verification is done also to remote I/O station modules. (Reset is enabled only when special registers D9116 to D9123 are reset.)	○	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
M9004	MINI link master module error	OFF:Normal ON: Error	• Turned on when the MINI (S3) link error is detected on even one of the MINI (S3) link modules being loaded. Remains on if normal status is restored.	—	Dedicated to AnA, A2AS, AnU and QCPU-A (A Mode).
*1 M9005	AC DOWN detection	OFF:AC power good ON: AC power DOWN	• Turned on when an momentary power failure of 20 msec or less occurred. Reset when the power is turned off and then on.	○	Usable with all types of CPUs.
M9006	Battery low	OFF:Normal ON: Battery low	• Turned on when battery voltage reduces to less than specified. Turned off when battery voltage becomes normal.	○	Usable with all types of CPUs.
*1 M9007	Battery low latch	OFF:Normal ON: Battery low	• Turned on when battery voltage reduces to less than specified. Remains on if battery voltage becomes normal	○	Usable with all types of CPUs.
*1 M9008	Self-diagnostic error	OFF:No error ON: Error	• Turned on when error is found as a result of self-diagnosis.	○	Usable with all types of CPUs.
M9009	Annunciator detection	OFF:No detection ON: Detected	• Turned on when the OUT F or SET F instruction is executed. Switched off when D9124 data is zeroed.	○	Usable with all types of CPUs.
M9010	Operation error flag	OFF:No error ON: Error	• Turned on when operation error occurs during execution of application instruction. Turned off when error is eliminated.	△	Unusable with A3H, A3M, AnA, A2AS, A3A board, AnU and QCPU-A (A Mode).
*1 M9011	Operation error flag	OFF:No error ON: Error	• Turned on when operation error occurs during execution of application instruction. Remains on if normal status is restored.	○	Usable with all types of CPUs.
M9012	Carry flag	OFF:Carry off ON: Carry on	• Carry flag used in application instruction.	○	Usable with all types of CPUs.

Table App.2.1 Special Relay List (continued)

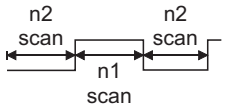
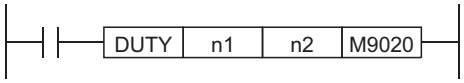
Number	Name	Description	Details	Applicable CPU	
M9016	Data memory clear flag	OFF: No processing ON: Output clear	• Clears the data memory including the latch range (other than special relays and special registers) in remote run mode from computer, etc. when M9016 is on.	○	Usable with all types of CPUs.
M9017	Data memory clear flag	OFF:No processing ON: Output clear	• Clears the unlatched data memory (other than special relays and special registers) in remote run mode from computer, etc. when M9017 is on.	○	Usable with all types of CPUs.
*2 M9018	Data link monitor switching	OFF:F link ON: R link	• Specifies the lines to be monitored for link monitoring.	—	Dedicated to A3V.
M9020	User timing clock No. 0		• Relay that repeats on/off at intervals of predetermined scan. • When power is turned on or reset is per-formed, the clock starts with off. • Set the intervals of on/off by DUTY instruction. 	○	Usable with all types of CPUs.
M9021	User timing clock No. 1				
M9022	User timing clock No. 2				
M9023	User timing clock No. 3				
M9024	User timing clock No. 4				
*2 M9025	Clock data set request	OFF:No processing ON: Set requested	• Writes clock data from D9025-D9028 to the clock element after the END instruction is executed during the scan in which M9025 has changed from off to on.	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
M9026	Clock data error	OFF:No error ON: Error	• Switched on by clock data (D9025 to D9028) error and switched off without an error.	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
M9027	Clock data display	OFF:No processing ON: Display	• Clock data such as month, day, hour, minute and minute are indicated on the CPU front LED display.	△	Usable with A3N, A3A, A3U, A4U, A73 and A3N board.
*2 M9028	Clock data read request	OFF:No processing ON: Read request	• Reads clock data to D9025-D9028 in BCD when M9028 is on.	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
*2 M9029	Data communication request batch process	OFF:No batch process ON: Batch process	• Turn M9029 on in the sequence program to process all data communication requests, which have been received in the entire scan, during END process of the scan. • The data communication request batch process can be turned on or off during operation. • Off in default state (Each data communication request is processed at the END process in the order of reception.)	△	Usable with AnU and A2US(H).

Table App.2.1 Special Relay List (continued)

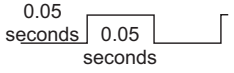
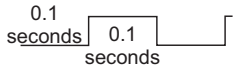
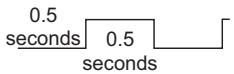
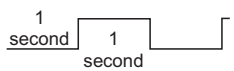
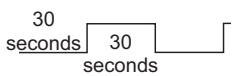
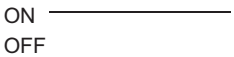
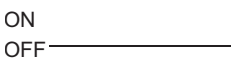
Number	Name	Description	Details	Applicable CPU	
M9030	0.1 second clock		• 0.1 second, 0.2 second, 1 second, 2 second, and 1 minute clocks are generated. • Not turned on and off per scan but turned on and off even during scan if corresponding time has elapsed. • Starts with off when power is turned on or reset is performed.	△	Unusable with A3V.
M9031	0.2 second clock				
M9032	1 second clock				
M9033	2 second clock				
M9034	1 minute clock				
M9036	Normally ON		• Used as dummy contacts of initialization and application instruction in sequence program. • M9036 and M9037 are turned on and off without regard to position of key switch on CPU front. M9038 and M9039 are under the same condition as RUN status except when the key switch is at STOP position, and turned off and on. Switched off if the key switch is in STOP position. M9038 is on for one scan only and M9039 is off for one scan only if the key switch is not in STOP position.	○	Usable with all types of CPU
M9037	Normally OFF				
M9038	On only for 1 scan after run				
M9039	RUN flag (off only for 1 scan after run)				
M9040	PAUSE enable coil	OFF:PAUSE disabled ON: PAUSE enabled	• When RUN key switch is at PAUSE position or remote pause contact has turned on and if M9040 is on, PAUSE mode is set and M9041 is turned on.	○	Usable with all types of CPU
M9041	PAUSE status contact	OFF:Not during pause ON: During pause			
M9042	Stop status contact	OFF:Not during stop ON: During stop	• Switched on when the RUN key switch is in STOP position.	○	Usable with all types of CPU
M9043	Sampling trace completion	OFF:During sampling trace ON: Sampling trace completion	• Turned on upon completion of sampling trace performed the number of times preset by parameter after STRA instruction is executed. Reset when STRAR instruction is executed.	△	Unusable with A1 and A1N.
M9044	Sampling trace	OFF → ON: STRA Same as execution ON → OFF: STRAR Same as execution	• Turning on/off M9044 can execute STRA / STRAR instruction. (M9044 is forcibly turned on/off by a peripheral device.) When switched from off to on: STRA instruction When switched from on to off: STRAR instruction The value stored in D9044 is used as the condition for the sampling trace. At scanning, at time → Time (10 msec unit)	△	Unusable with A1, A1N, AnA, AnU and QCPU-A (A Mode).
M9045	Watchdog timer (WDT) reset	OFF:WDT not reset ON: WDT reset	• Turn on M9045 to reset the WDT upon execution of a ZCOM instruction or data communication request batch process. (Use this function for scan times exceeding 200 ms.)	△	Unusable with A1 and A1N.

Table App.2.1 Special Relay List (continued)

Number	Name	Description	Details	Applicable CPU	
M9046	Sampling trace	OFF: Except during trace ON: During trace	• Switched on during sampling trace.	△	Unusable with A1 and A1N.
M9047	Sampling trace preparation	OFF: Sampling trace stop ON: Sampling trace start	• Turn on M9047 to execute sampling trace. Sampling trace is interrupted if M9047 is turned off.	△	Unusable with A1 and A1N.
*2 M9048	RUN LED flicker flag	ON: Flickers at annunciator on. OFF: No flicker at annunciator on.	• Sets whether the RUN LED flickers or not when the annunciator relay F□ is turned on when the A0J2H is used.	—	Usable with A0J2H.
M9048	Memory card battery voltage detection	OFF: Low voltage is not detected. ON: Low voltage is detected.	• Turned on when the drop in the battery voltage for the memory card is detected. (Automatically turned off when the voltage recovers to normal.)	—	Dedicated to QCPU-A (A Mode)
M9049	Switching the number of output characters	OFF: Up to NUL code are output. ON: 16 characters are output.	• When M9049 is off, up to NUL (00_H) code are output. • When M9049 is on, ASCII codes of 16 characters are output.	△	Unusable with An, A3V, A2C and A52G
*2 M9050	Operation result storage memory change contact (for CHG instruction)	OFF: Not changed ON: Changed	• Switched on to exchange the operation result storage memory data and the save area data.	—	Dedicated to A3
M9051	CHG instruction execution disable	OFF: Enable ON: Disable	• Switched on to disable the CHG instruction. • Switched on when program transfer is requested and automatically switched off when transfer is complete.	—	Usable with A3, A3N, A3H, A3M, A3V, A3A, A3U, A4U, A73 and A3N board
*2 M9052	SEG instruction switching	OFF: 7SEG display ON: Partial refresh	• Switched on to execute the SEG instruction as a partial refresh instruction. Switched off to execute the SEG instruction as a 7SEG display instruction.	△	Unusable with An, A3H, A3M, A3V, AnA, AnU, A3V and A3A board
*2 M9053	EI / DI instruction switching	OFF: Sequence interrupt control ON: Link interrupt control	• Switched on to execute the link refresh enable, disable (EI, DI) instructions.	△	Unusable with An, A3V and A3N board
M9054	STEP RUN flag	OFF: Other than step run ON: During step run	• Switched on when the RUN key switch is in STEP RUN position.	△	Unusable with An, AnS, AnSH, A1FX, A2C, A0J2H, and A52G
M9055	Status latch complete flag	OFF: Not complete ON: Complete	• Turned on when status latch is completed. Turned off by reset instruction.	△	Unusable with A1 and A1N.
M9056	Main program P, I set request	OFF: Other than P, I set request ON: P, I set request	• Provides P, I set request after transfer of the other program (for example subprogram when main program is being run) is complete during run. Automatically switched off when P, I setting is complete.	—	Usable with A3, A3N, A3H, A3M, A3V, A3A, A73, A3U, A4U and A3N board
M9057	Subprogram 1 P, I set request	OFF: Except during P, I set request ON: During P, I set request			
M9060	Subprogram 2 P, I set request			—	Dedicated to A4U
M9061	Subprogram 3 P, I set request				

Table App.2.1 Special Relay List (continued)

Number	Name	Description	Details	Applicable CPU	
M9060	Remote terminal error	OFF:Normal ON: Error	• Turned on when one of remote terminal modules has become a faulty station. (Communication error is detected when normal communication is not restored after the number of retries set at D9174.) • Turned off when communication with all re-mote terminal modules is restored to normal with automatic online return enabled. • Remains on when automatic online return is disabled. • Not turned on or off when communication is suspended at error detection.	—	Usable with A2C and A52G
M9061	Communication error	OFF:Normal ON: Error	• Turned on when communication with a remote terminal module or an I/O module is faulty. • Communication error occurs due to the following reasons. • Initial data error • Cable breakage • Power off for remote terminal modules or I/O modules • Turned off when communication is restored to normal with automatic online return enabled • Remains on when communication is suspended at error detection with automatic online return disabled.	—	Usable with A2C and A52G
M9065	Divided transfer status	OFF:Other than divided processing ON: Divided processing	• Turned on when canvas screen transfer to AD57 (S1)/AD58 is done by divided processing, and turned off at completion of divided processing.	—	Usable with AnA, and AnU.
*2 M9066	Transfer processing switching	OFF:Batch transfer ON: Divided transfer	• Turned on when canvas screen transfer to AD57 (S1)/AD58 is done by divided processing.	—	Usable with AnA, and AnU.
M9067	I/O module error detection	OFF:Normal ON: Error	• Turned on when one of I/O modules has become a faulty station. (Communication error is detected when normal communication is not restored after the number of retries set at D9174.) • Turned off when communication with all I/O modules is restored to normal with automatic online return enabled. • Remains on when automatic online return is disabled. • Not turned on or off when communication is suspended at error detection.	—	Usable with A2C and A52G.
M9068	Test mode	OFF:Automatic online return enabled Automatic online return disabled Communication suspended at online error ON: Line check	• Turned on when line check with I/O modules and remote terminal modules is performed. • Turned off when communication with I/O modules and remote terminal modules is per-formed.	—	Usable with A2C and A52G.
M9069	Output at line error	OFF:All outputs are turned off. ON: Outputs are retained.	• Sets whether all outputs are turned off or retained at communication error. OFF: All outputs are turned off at communication error. ON: Outputs before communication error are retained.	—	Usable with A2C and A52G.

Table App.2.1 Special Relay List (continued)

Number	Name	Description	Details	Applicable CPU	
*2 M9070	Time required for search of A8UPU/A8PUJ	OFF: No reading time reduction ON: Reading time reduction	• Turn on to reduce the search time of A8UPU/ A8PUJ. (In this case, the scan time of the CPU module extends by 10%.)	△	Usable with AnU and A2US(H).
*1 M9073	WDT error flag	OFF: No WDT error ON: WDT error	• Turns on when WDT error is detected by the self-check of the PCPU.	—	Dedicated to A73.
M9073	Clock data set request	OFF: No processing ON: Set request is made	• The clock data registered in D9073 to D9076 is written to the clock device after the execution of the END instruction of the scan in which the state of M9073 changes from off to on.	—	Dedicated to A2CCPUC24 (-PRF)
M9073	Setting of writing to flash ROM	OFF: Disables writing to ROM ON: Enables writing to ROM	• Turned on to enable writing to the flash ROM. (DIP switch 3 should be set to on.)	—	Dedicated to QCPU-A (A Mode)
M9074	PCPU ready complete flag	OFF: PCPU ready incomplete ON: PCPU ready complete	• Set if the motor is not running when it is checked at programmable controller ready (M2000) on. Turned off when M2000 is turned off.	—	Dedicated to A73.
M9074	Clock data error	OFF: No error ON: Error occurred	• This goes on when a clock data (D9073 to D9076) error occurs. This remains off when there is no error.	—	Dedicated to A2CCPUC24 (-PRF)
M9074	Request for writing to flash ROM	OFF → ON: Starts writing to ROM	• When turned from off to on, writing to the built-in ROM is started.	—	Dedicated to QCPU-A (A Mode)
M9075	Test mode flag	OFF: Other than test mode ON: Test mode	• Turned on when a test mode request is made from a peripheral device. Reset when test mode is finished.	—	Dedicated to A73.
M9075	Successful completion of writing to built-in ROM	OFF: Failed writing to ROM ON: Successfully completed writing to ROM	• Turned on when writing to the built-in ROM is successfully completed. (This status is stored in D9075.)	—	Dedicated to QCPU-A (A Mode)
M9076	External emergency stop input flag	OFF: External emergency stop input is on. ON: External emergency stop input is off.	• Turned off when the external emergency stop input connected to the EMG terminal of A70SF is turned on. Turned on when the external emergency stop input is turned off.	—	Dedicated to A73.
M9076	Clock data read request	OFF: No procesing ON: Read request is made	• When M9076 is on, clock data is read out to D9073 to D9076 in BCD values.	—	Dedicated to A2CCPUC24 (-PRF)
M9076	Status of writing to built-in ROM	OFF: Writing to ROM disabled ON: Writing to ROM enabled	• Turns on when writing to built-in ROM is enabled. (Turns on when DIP switch and M9073 are on.)	—	Dedicated to QCPU-A (A Mode)
M9077	Manual pulse generator axis setting error flag	OFF: All axes normal ON: Error axis detected	• Turned on when there is an error in the contents of manual pulse generator axis setting. Turned off if all axes are normal when the manual pulse generator enable flag is turned on.	—	Dedicated to A73.

Table App.2.1 Special Relay List (continued)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>M9077</td><td>Sequence accumulation time measurement</td><td>OFF: Time not elapsed
ON: Time elapsed</td><td>• Compares the setting value at D9077 with the time elapsed from the start of measurement (accumulation time) at every scan. Then, performs the following operations:
Setting value > Accumulation time:
Turns on M9077 and clears the accumulation time.
Setting value < Accumulation time:
Turns M9077 from on to off and clears the accumulation time. When M9077 is already off, clears the accumulation time.
* When 1 to 255 is designated at D9077, M9077 is turned on at the first scan.
* When the value other than 1 to 255 is designated at D9077, the value in D9077 is reset to 0 and M9077 is always turned off.</td><td>—</td><td>Dedicated to QCPU-A (A Mode)</td></tr>
<tr><td>M9078</td><td>Test mode request error flag</td><td>OFF: No error
ON: Error</td><td>• Turned on when test mode is not available though a test mode request was made from a peripheral device. Turned off if test mode becomes available by making another test mode request.</td><td>—</td><td>Dedicated to A73.</td></tr>
<tr><td>M9079</td><td>Servo program setting error flag</td><td>OFF: No data error
ON: Data error</td><td>• Turned on when the positioning data of the servo program designated by the DSFRP instruction has an error.
Turned off when the data has no error after the DSFRP instruction is executed again.</td><td>—</td><td>Dedicated to A73.</td></tr>
<tr><td>M9080</td><td>BUSY flag for execution of CC-Link dedicated instruction</td><td>OFF: Number of remaining instructions executable simultaneously: 1 to 10
ON: Number of remaining instructions executable simultaneously: 0</td><td>Turned on or off according to the number of remaining instructions (RIRD / RIWT / RISEND / RIRCV) being executable simultaneously at one scan.
OFF: Number of remaining instructions executable simultaneously: 1 to 10
ON: Number of remaining instructions executable simultaneously: 0
By assigning M9080 as execution condition, the number of instructions above executed simultaneously at one scan can be limited to 10 or less.
*4: This function is available with the CPU of the following S/W versions or later.
<table>
<tr><th>CPU Type Name</th><th>Software Version</th></tr>
<tr><td>Q02CPU-A, Q02HCPU-A, Q06HCPU-A</td><td rowspan="2">Available with all versions</td></tr>
<tr><td>A1SJHCPU, A1SHCPU, A2SHCPU</td></tr>
<tr><td>A2UCPU(S1), A3UCPU, A4UCPU</td><td>S/W version Q (Manufactured in July, 1999)</td></tr>
<tr><td>A2USCPU(S1)</td><td>S/W version E (Manufactured in July, 1999)</td></tr>
<tr><td>A2USHCPU-S1</td><td>S/W version L (Manufactured in July, 1999)</td></tr>
</table></td><td>△</td><td>Can be used only with AnU, A2US, or AnSH, QCPU-A (A Mode) *4</td></tr>
</table>

Table App.2.1 Special Relay List (continued)

Number	Name	Description	Details	Applicable CPU	
M9081	Registration area busy signal for communication request	OFF: Communication request to remote terminal modules enabled ON: Communication request to remote terminal modules disabled	• Indication of communication enable/disable to remote terminal modules connected to the MINI (S3) link module, A2C or A52G.	—	Usable with AnA, AnA, AnU, A2AS, QCPU-A (A Mode) A2C and A52G.
M9082	Final station number disagreement	OFF: Final station number agreement ON: Final station number disagreement	• Turned on when the final station number of the remote terminal modules and remote I/O modules connected to the A2C or A52G disagrees with the total number of stations set in the initial setting. • Turned off when the final station number agrees with the total number of stations at STOP → RUN	—	Dedicated to A2C and A52G.
*2 M9084	Error check	OFF: Checks enabled ON: Checks disabled	• Specify whether the following errors are to be checked or not after the END instruction is executed (to set END instruction processing time): • Fuse blown • I/O unit verify error • Battery error	△	Unusable with An, A2C and A3V.
M9086	BASIC program RUN flag	OFF: A3M-BASIC stop ON: A3M-BASIC run	• Turned on when the A3M-BASIC is in RUN state, and turned off when it is in STOP state.	—	Dedicated to A3M
M9087	BASIC program PAUSE flag	OFF: A3M-BASIC RUN enable ON: A3M-BASIC disable	• Specifies enable/disable of A3M-BASIC execution when the A3MCPU is in PAUSE state. OFF: A3M-BASIC is executed. ON: A3M-BASIC is not executed.	—	Dedicated to A3M.
M9090	Power supply problem status on the PC side	OFF: Normal ON: Power off	• Turns on if the power to the PC side is shut off when the external power supply is connected to the CPU board. It stays on even after the status becomes normal.	—	Dedicated to A2USH board
*1 M9091	Operation error detail flag	OFF: No error ON: Error	• Turned on when an operation error detail factor is stored at D9091, and remains on after normal state is restored.	—	Usable with AnA, A2AS, AnU and QCPU-A (A Mode).
*1 M9091	Microcomputer subroutine call error flag	OFF: No error ON: Error	• Turned on when an error occurred at execution of the microcomputer program package, and remains on after normal state is restored.	—	Unusable with AnA, A2AS, AnU and QCPU-A (A Mode).
M9092	External power supply problem status	OFF: Normal ON: Power off	• Turns on when the external power being supplied to the CPU board is shut off. It stays on even after the status becomes normal.	—	Dedicated to A2USH board
M9092	Duplex power supply overheat error	OFF: Normal ON: Overheat	• Turned on when overheat of a duplex power supply module is detected.	—	Dedicated to A3V.
M9093	Duplex power supply error	OFF: Normal ON: Failure or AC power supply down	• Turned on when a duplex power supply module caused failure or the AC power supply is cut down.	—	Dedicated to A3V.

Table App.2.1 Special Relay List (continued)

Number	Name	Description	Details	Applicable CPU	
*2 *3 M9094	I/O change flag	OFF: Changed ON: Not changed	• After the head address of the required I/O module is set to D9094, switching M9094 on allows the I/O module to be changed in online mode. (One module is only allowed to be changed by one setting.) • To be switched on in the program or peripheral device test mode to change the module during CPU RUN. To be switched on in peripheral device test mode to change the module during CPU STOP. • RUN/STOP mode must not be changed until I/O module change is complete.	—	Usable with An, AnN, AnA, AnU.
M9095	Duplex operation verify error	OFF: Normal ON: Duplex operation verify error	• During duplex operation of the operating CPU with a stand-by CPU, verification is performed by the both to each other. Turned on when a verify error occurred.	—	Dedicated to A3V.
M9096	A3VCPU A selfcheck error	OFF: No error ON: Error	• Turn on when a self-check error occurred on the A3VCPU A mounted next to the A3VTU.	—	Dedicated to A3V.
M9097	A3VCPU B selfcheck error	OFF: No error ON: Error	• Turn on when a self-check error occurred on the A3VCPU B mounted next to the A3VCPU A.	—	Dedicated to A3V.
M9098	A3VCPU C selfcheck error	OFF: No error ON: Error	• Turn on when a self-check error occurred on the A3VCPU C mounted next to the A3VCPU B.	—	Dedicated to A3V.
M9099	A3VTU selfcheck error	OFF: No error ON: Error	• Turned on when a self-check error occurred on the A3VTU.	—	Dedicated to A3V.
M9100	SFC program registration	OFF: No SFC program ON: SFC program registered	• Turned on if the SFC program is registered, and turned off if it is not.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
*2 M9101	SFC program start/stop	OFF: SFC program stop ON: SFC program start	• Should be turned on by the program if the SFC program is to be started. If turned off, operation output of the execution step is turned off and the SFC program is stopped.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
*2 M9102	SFC program starting status	OFF: Initial start ON: Continuous start	• Selects the starting step when the SFC program is restarted using M9101. ON: Started with the step of the block being executed when the program stopped. OFF: All execution conditions when the SFC program stopped are cleared, and the program is started with the initial step of block 0. • Once turned on, the program is latched in the system and remains on even if the power is turned off. Should be turned off by the sequence program when turning on the power, or when starting with the initial step of block 0.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table App.2.1 Special Relay List (continued)

Number	Name	Description	Details	Applicable CPU	
M9103 *2	Consecutive step transfer enable/disable	OFF: Consecutive step transfer disable ON: Consecutive step transfer enable	• Selects consecutive or step-by-step transfer of steps of which transfer conditions are established when all of the transfer conditions of consecutive steps are established. ON: Consecutive transfer is executed. OFF: One step per one scan is transferred.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9104	Consecutive transfer prevention flag	OFF: Transfer complete ON: Transfer incomplete	• Turned on when consecutive transfer is not executed with consecutive transfer enabled. Turned off when transfer of one step is completed. Consecutive transfer of a step can be prevented by writing an AND condition to corresponding M9104.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9108 *2	Step transfer monitoring timer start (corresponds to D9108)	OFF: Monitoring timer reset ON: Monitoring timer reset start	• Turned on when the step transfer monitoring timer is started. Turned off when the monitoring timer is reset.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9109 *2	Step transfer monitoring timer start (corresponds to D9109)				
M9110 *2	Step transfer monitoring timer start (corresponds to D9110)				
M9111 *2	Step transfer monitoring timer start (corresponds to D9111)				
M9112 *2	Step transfer monitoring timer start (corresponds to D9112)				
M9113 *2	Step transfer monitoring timer start (corresponds to D9113)				
M9114 *2	Step transfer monitoring timer start (corresponds to D9114)				

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table App.2.1 Special Relay List (continued)

Number	Name	Description	Details	Applicable CPU	
M9180	Active step sampling trace complete flag	OFF: Trace start ON: Trace complete	• Turned on when sampling trace of all specified blocks is completed. Turned off when sampling trace is started.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9181	Active step sampling trace execution flag	OFF: Trace not executed. ON: Trace being executed.	• Turned on when sampling trace is being executed. Turned off when sampling trace is completed or suspended.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9182 *2	Active step sampling trace enable	OFF: Trace disable/ suspend ON: Trace enable	• Selects sampling trace execution enable/disable. ON: Sampling trace execution is enabled. OFF: Sampling trace execution is disabled. If turned off during sampling trace execution, trace is suspended.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9196 *2	Operation output at block stop	OFF: Coil output off ON: Coil output on	• Selects the operation output when block stop is executed. ON: Retains the on or off status of the coil being used by using operation output of the step being executed at block stop. OFF: All coil outputs are turned off. (Operation output by the SET instruction is retained regardless of the on or off status of M9196.)	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9197 M9198	Fuse blow, I/O verify error display switching	M9197 / M9198 / I/O numbers to be displayed OFF / OFF / X/Y0 to 7F0 ON / OFF / X/Y800 to FF0 OFF / ON / X/Y1000 to 17F0 ON / ON / X/Y1800 to 1FF0	• Switches I/O numbers in the fuse blow module storage registers (D9100 to D9107) and I/O module verify error storage registers (D9116 to D9123) according to the combination of on and off states of M9197 and M9198.	—	Usable with AnU, A2AS and QCPU-A (A Mode)
M9199	Data recovery of online sampling trace / status latch	OFF: No data recovery ON: Data recovery	• When sampling trace / status latch is executed, the setting data stored in the CPU module is recovered to enable restart. • Turn on M9199 to execute again. (There is no need to write data with the peripheral device.)	—	Usable with AnU, A2AS and QCPU-A (A Mode)

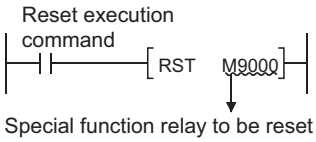
*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

POINTS

(1) Contents of the M special relays are all cleared by power off, latch clear or reset with the reset key switch. When the RUN/STOP key switch is set in the STOP position, the contents are retained.

(2) The above relays with numbers marked *1 remain "on" if normal status is restored. Therefore, to turn them "off", use the following method:

(a) Method by use program
Insert the circuit shown at right into the user program and turn on the reset execution command contact to clear the special relay M.



(b) Use the test function of the peripheral device to reset forcibly.
For the operation procedure, refer to the manuals for peripheral devices.

(c) By moving the RESET key switch on the CPU front to the RESET position, the special relays are turned off.

(3) Special relays marked *2 above are switched on/off in the sequence program.

(4) Special relays marked *3 above are switched on/off in test mode of the peripheral equipment.

(5) Turn off the following special relays after resetting the related special resisters. Unless the related special registers are reset, the special relays will be turned on again even if they are turned reset. (Except for the AnU, A2US(H), and QCPU-A (A mode).)

Special Relay	Related Special Resister
M9000	D9100 to D9107
M9001	D9116 to D9123

Appendix2.2 Special Registers

Special registers are data registers of which applications have been determined inside the programmable controller. Therefore, do not write data to the special registers in the program (except the ones with numbers marked 2 in the table).

Table App.2.2 Special Register List

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9000</td><td>Fuse blow</td><td>Fuse blow module number</td><td>• When fuse blown modules are detected, the lowest number of detected units is stored in hexadecimal. (Example: When fuses of Y50 to 6F output modules have blown, "50" is stored in hexadecimal) To monitor the number by peripheral devices, perform monitor operation given in hexadecimal.
(Cleared when all contents of D9100 to D9107 are reset to 0.)
• Fuse blow check is executed also to the output modules of remote I/O stations.</td><td>△</td><td>Unusable with A0J2H.
(Only remote I/O station information is valid for A2C.)</td></tr>
<tr><td>D9001</td><td>Fuse blow</td><td>Fuse blow module number</td><td>• Stores the module numbers corresponding to setting switch numbers or base slot numbers when fuse blow occurred.
<table>
<tr><th colspan="2">I/O Module for A0J2</th><th colspan="2">Extension Base Unit</th></tr>
<tr><th>Setting Switch</th><th>Stored Data</th><th>Base Unit Slot No.</th><th>Stored Data</th></tr>
<tr><td>0</td><td>1</td><td>0</td><td>5</td></tr>
<tr><td>1</td><td>2</td><td>1</td><td>6</td></tr>
<tr><td>2</td><td>3</td><td>2</td><td>7</td></tr>
<tr><td>3</td><td>4</td><td>3</td><td>8</td></tr>
<tr><td>4</td><td>5</td><td></td><td></td></tr>
<tr><td>5</td><td>6</td><td></td><td></td></tr>
<tr><td>6</td><td>7</td><td></td><td></td></tr>
<tr><td>7</td><td>8</td><td></td><td></td></tr>
</table>
• In case of remote I/O station, (module I/O number/10H) + 1 is stored.</td><td>—</td><td>Dedicated to A0J2H.</td></tr>
<tr><td rowspan="2">D9002</td><td rowspan="2">I/O module verify error</td><td rowspan="2">I/O module verify error unit number</td><td>• If an I/O module whose data is different from the entered data when the power is turned on is detected, the head I/O number of the detected module is stored in hexadecimal. When the situation is detected in multiple modules, the lowest number among the module will be stored. (Storing method is the same as that of D9000.) To monitor the number by peripheral devices, perform monitor operation given in hexadecimal.
(Cleared when all contents of D9116 to D9123 are reset to 0.)
• I/O module verify check is executed also to the modules of remote I/O terminals.</td><td>△</td><td>Unusable with A0J2H.
(Only remote I/O station information is valid for A2C.)</td></tr>
<tr><td>• If an I/O module, of which data is different from data entered, is detected when the power in turned on, the I/O number corresponding to the setting switch No. or base unit No. is stored.(Storing method is the same as that of D9001).
• In case of remote I/O station, (module I/O number/10H) + 1 is stored.</td><td>—</td><td>Dedicated to A0J2H.</td></tr>
</table>

Table App.2.2 Special Register List (continued)

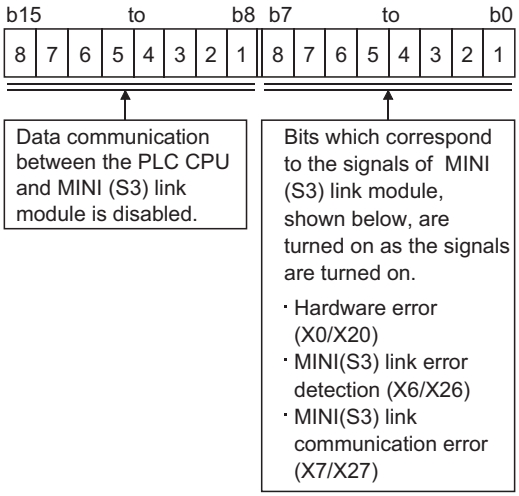
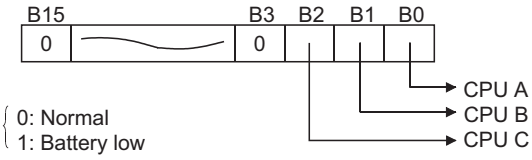
Number	Name	Description	Details	Applicable CPU	
D9003	SUM instruction detection bits	The number of bits detected by SUM instruction detection.	• The number of bits detected by execution of the SUM instruction are stored. in BIN code and updated every execution thereafter.	—	Dedicated to A0J2H.
*1 D9004	MINI link master module error	Error detection status	• Error status of the MINI (S3) link detected on loaded MINI (S3) link module is stored. 	—	Usable with AnA, A2AS, AnA board and AnU.
*1 D9005	AC DOWN counter	AC DOWN count	• 1 is added each time input voltage becomes 85% or less of rating while the CPU unit is performing operation, and the value is stored in BIN code.	○	Usable with all types of CPUs.
D9006	Battery low	Indicates the CPU module of which battery voltage is low.	• Bits which correspond to CPU of which battery is low are turned on in D9006, as shown below. 	—	Dedicated to A3V.
*1 D9008	Shelf-diagnostic error	Self-diagnostic error number	• When error is found as a result of self-diagnosis, error number is stored in BIN code.	○	Usable with all types of CPUs.
D9009	Annunciator detection	F number at which external failure has occurred	• When one of F0 to 255 is turned on by OUT F or SET F, the F number, which has been detected earliest among the F numbers which have turned on, is stored in BIN code. • D9009 can be cleared by RST F or LEDR instruction. If another F number has been detected, the clearing of D9009 causes the next number to be stored in D9009.	△	Unusable with A3, A3N, A3A, A73 and A3N board.
			• When one of F0 to 255 is turned on by OUT F or SET F, the F number, which has been detected earliest among the F numbers which have turned on, is stored in BIN code. • D9009 can be cleared by executing RST F or LEDR instruction or moving INDICATOR RESET switch on the CPU front to the ON position. If another F number has been detected, the clearing of D9009 causes the next number to be stored in D9009.	—	Usable with A3, A3N, A3A, A73 and A3N board.

Table App.2.2 Special Register List (continued)

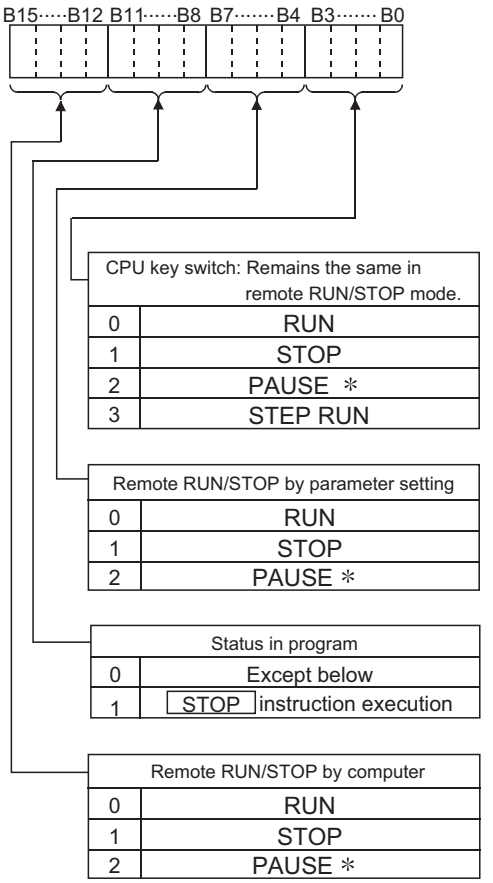
Number	Name	Description	Details	Applicable CPU	
D9010	Error step	Step number at which operation error has occurred	• When operation error has occurred during execution of application instruction, the step number, at which the error has occurred, is stored in BIN code. Thereafter, each time operation error occurs, the contents of D9010 are renewed.	△	Unusable with A3H and A3M.
D9011 *1	Error step	Step number at which operation error has occurred	• When operation error has occurred during execution of application instruction, the step number, at which the error has occurred, is stored in BIN code. Since storage into D9011 is made when M9011 changes from off to on, the contents of D9010 cannot be renewed unless M9011 is cleared by user program.	○	Usable with all types of CPUs.
D9014	I/O control mode	I/O control mode number	• The I/O control mode set is returned in any of the following numbers: 0. Both input and output in direct mode 1. Input in refresh mode, output in direct mode 3. Both input and output in refresh mode	△	Unusable with An, A3H and A3M.
D9015	CPU operating states	Operating states of CPU	• The operation states of CPU as shown below are stored in D9015.  * When the CPU is in RUN mode and M9040 is off, the CPU remains in RUN mode if changed to PAUSE mode.	○	Usable with all types of CPUs.

Table App.2.2 Special Register List (continued)

Number	Name	Description	Details	Applicable CPU	
D9016	ROM/RAM setting	0: ROM 1: RAM 2: E^2PROM	• Indicates the setting of memory select chip. One value of 0 to 2 is stored in BIN code.	—	Usable with A1 and A1N.
	Program number	0: Main program (ROM) 1: Main program (RAM) 2: Subprogram (RAM)	• Indicates which sequence program is run presently. One value of 0 to 2 is stored in BIN code. ("2" is not stored when AnS, AnSH, A1FX, A0J2H, A2C, A2, A2N, A2A, A2AS and A2U is used.)	△	Unusable with A1 and A1N
		0: Main program (ROM) 1: Main program (RAM) 2: Subprogram 1 (RAM) 3: Subprogram 2 (RAM) 4: Subprogram 3 (RAM) 5: Subprogram 1 (ROM) 6: Subprogram 2 (ROM) 7: Subprogram 3 (ROM) 8: Main program (E^2PROM) 9: Subprogram 1 (E^2PROM) A: Subprogram 2 (E^2PROM) B: Subprogram 3 (E^2PROM)	• Indicates which sequence program is run presently. One value of 0 to B is stored in BIN code.	—	Dedicated to AnU.
D9017	Scan time	Minimum scan time (per 10 ms)	• If scan time is smaller than the content of D9017, the value is newly stored at each END. Namely, the minimum value of scan time is stored into D9017 in BIN code.	○	Usable with all types of CPUs.
D9018	Scan time	Scan time (per 10 ms)	• Scan time is stored in BIN code at each END and always rewritten.	○	Usable with all types of CPUs.
D9019	Scan time	Maximum scan time (per 10 ms)	• If scan time is larger than the content of D9019, the value is newly stored at each END. Namely, the maximum value of scan time is stored into D9019 in BIN code.	○	Usable with all types of CPUs.
D9020 *2	Constant scan	Constant scan time (Set by user in 10 ms increments)	• Sets the interval between consecutive user program starts in multiples of 10 ms. 0: No setting 1 to 200: Set. Program is executed at intervals of (set value) × 10 ms.	△	Unusable with An.
D9021	Scan time	Scan time (1 ms unit)	• Scan time is stored and updated in BIN code after every END.	—	Usable with AnA, A2AS, AnU, AnA board and QCPU-A (A Mode).
D9022	1 second counter	Counts 1 every second.	• When the programmable controller CPU starts running, it starts counting 1 every second. • It starts counting up from 0 to 32767, then down to -32768 and then again up to 0. Counting repeats this routine.	—	

Table App.2.2 Special Register List (continued)

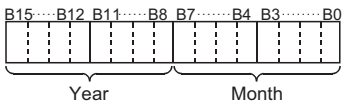
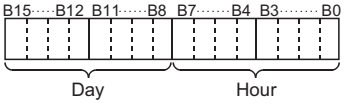
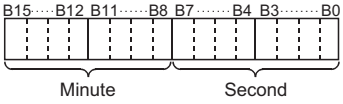
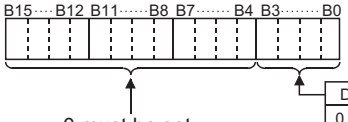
Number	Name	Description	Details	Applicable CPU	
*2 D9025	Clock data	Clock data (Year, month)	• Stores the year (2 lower digits) and month in BCD.  Example: 1987,July H8707	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
*2 D9026	Clock data	Clock data (Day, hour)	• Stores the day and hour in BCD.  Example: 31th,10 o'clock H3110	△	
*2 D9027	Clock data	Clock data (Minute, second)	• Stores the Minute and second in BCD.  Example: 35 minutes, 48 seconds H3548	△	
*2 D9028	Clock data	Clock data (, day of the week)	• Stores the day of the week in BCD.  Example: Friday H0005 Day of the week: 0 Sunday; 1 Monday; 2 Tuesday; 3 Wednesday; 4 Thursday; 5 Friday; 6 Saturday	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.

Table App.2.2 Special Register List (continued)

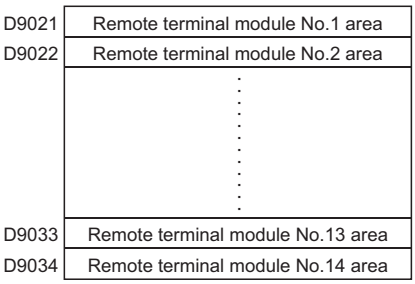
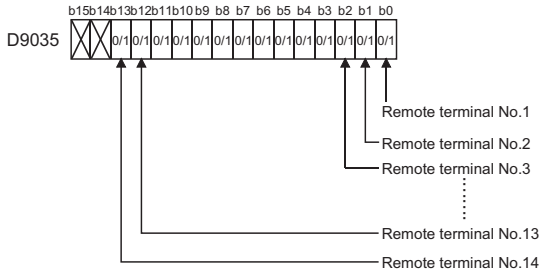
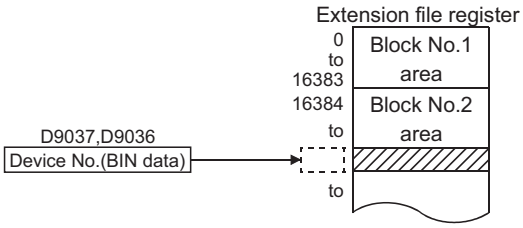
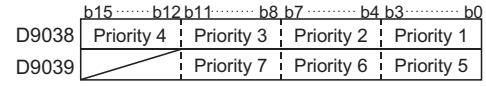
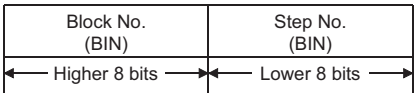
Number	Name	Description	Details	Applicable CPU	
D9021 D9022 D9023 D9024 D9025 D9026 D9027 D9028 D9029 D9030 D9031 D9032 D9033 D9034	Remote terminal parameter setting	1 to 61	• Sets the head station number of remote terminal modules connected to A2C and A52G. Setting is not necessarily in the order of station numbers. A2CCPUC24:1 to 57 Other CPUs:1 to 61 • Data configuration 	—	Usable with A2C and A52G.
D9035	Attribute of remote terminal module	0: MINI standard protocol 1: No protocol	• Sets attribute of each remote terminal module connected to A2C and A52G with 0 or 1 at each bit. 0: Conforms to the MINI standard protocol or remote terminal unit. 1: No-protocol mode of AJ35PTF-R2 • Data configuration 		
D9035	Extension file register	Use block No.	• Stores the block No. of the extension file register being used in BCD code.	—	Usable with AnA, A2AS, AnU and QCPU-A (A Mode).
D9036	Total number of stations	1 to 64	• Sets the total number of stations (1 to 64) of I/O modules and remote terminal modules which are connected to an A2C or A52G.	—	Usable with A2C and A52G.

Table App.2.2 Special Register List (continued)

Number	Name	Description	Details	Applicable CPU	
D9036 D9037	For designation extension file register device numbers	The devise number used for getting direct access to each device for extension file register	• Designate the device number for the extension file register for direct read and write in 2 words at D9036 and D9037 in BIN data. Use consecutive numbers beginning with R0 of block No. 1 to designate device numbers. 	—	Usable with AnA, A2AS, AnU and QCPU-A (A Mode).
D9038 D9039	LED indication priority	Priority 1 to 4 Priority 5 to 7	• Sets priority of ERROR LEDs which illuminate (or flicker) to indicate errors with error code numbers. • Configuration of the priority setting areas is as shown below.  • For details, refer to the applicable CPU user's manual and the ACPU (Fundamentals) programming manual.	—	Usable with A2C, AnS, AnSH, A1FX, A0J2H, A52G AnA, A2AS, AnU and QCPU-A (A Mode).
D9044	Sampling trace	Step or time during sampling trace	• The value stored in D9044 is used as the condition of the sampling trace when M9044 is turned on or off with the peripheral device to start sampling trace STRA or STRAR . At scanning ... 0 At time..... Time (10 ms unit) Stores the value in BIN code for D9044.	△	Usable with A1 and A1N
D9049	SFC program execution work area	Expansion file register block number to be used as the work area for the execution of a SFC program.	• Stores the block number of the expansion file register which is used as the work area for the execution of a SFC program in a binary value. • Stores "0" if an empty area of 16K bytes or smaller, which cannot be expansion file register No. 1, is used or if M9100 is off.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
D9050	SFC program error code	Code number of error occurred in the SFC program	• Stores code numbers of errors occurred in the SFC program in BIN code. 0: No error 80: SFC program parameter error 81: SFC code error 82: Number of steps of simultaneous execution exceeded 83: Block start error 84: SFC program operation error		
D9051	Error block	Block number in which an error occurred.	• Stores the block number in which an error occurred in the SFC program in BIN code. In the case of error 83 the starting block number is stored.	—	

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table App.2.2 Special Register List (continued)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9052</td><td>Error step</td><td>Step number in which an error occurred.</td><td>• Stores the step number in which error 84 occurred in the SFC program in BIN code.
Stores "0" when errors 80, 81 and 82 occurred.
Stored the block starting step number when error 83 occurred.</td><td>—</td><td rowspan="3">Usable with AnN*, AnA*, AnU, A2S, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.</td></tr>
<tr><td>D9053</td><td>Error transfer</td><td>Transfer condition number in which an error occurred.</td><td>• Stores the transfer condition number in which error 84 occurred in the SFC program in BIN code.
Stored "0" when errors 80, 81, 82 and 83 occurred.</td><td>—</td></tr>
<tr><td>D9054</td><td>Error sequence step</td><td>Sequence step number in which an error occurred.</td><td>• Stores the sequence step number of transfer condition and operation output in which error 84 occurred in the SFC program in BIN code.</td><td>—</td></tr>
<tr><td>D9055</td><td>Status latch execution step number</td><td>Status latch execution step number</td><td>• Stores the step number when status latch is executed.
• Stores the step number in a binary value if status latch is executed in a main sequence program.
• Stores the block number and the step number if status latch is executed in a SFC program.
 
</td><td>—</td><td>Usable with AnA, A2AS, AnA bpard, AnU and QCPU-A (A Mode).</td></tr>
<tr><td>D9060</td><td>Software version</td><td>Software version of internal system</td><td>Stores the software version of the CPU module's internal system in ASCII codes.
Example: Stores "41H" for version A.
Note)The software version of the internal system may be different from the version marked on the housing.
*5: This function is available with the CPU of the following S/W versions or later.
<table>
<tr><th>CPU Type Name</th><th>Software Version</th></tr>
<tr><td>A2ACPU (P21/R21), A2ACPU-S1 (P21/R21)</td><td>S/W version W (Manufactured in July, 1998)</td></tr>
<tr><td>A3ACPU (P21/R21)</td><td>S/W version X (Manufactured in July, 1998)</td></tr>
<tr><td>A2UCPU (S1), A3UCPU, A4UCPU</td><td>S/W version H (Manufactured in July, 1998)</td></tr>
<tr><td>A1SJHCPU, A1SHCPU, A2SHCPU</td><td>S/W version H (Manufactured in May, 1998)</td></tr>
<tr><td>A2USCPU (S1)</td><td>S/W version Y (Manufactured in July, 1998)</td></tr>
<tr><td>A2USHCPU-S1</td><td>S/W version E (Manufactured in July, 1998)</td></tr>
</table></td><td>△</td><td>Can be used only with AnU, A2US, or AnSH. *5</td></tr>
<tr><td>D9061</td><td>Communication error code</td><td>0: Normal
1: Initial data error
2: Line error</td><td>• Stores error code when M9061 is turned on (communication with I/O modules or remote terminal modules fails).
• 1 ..... Total number of stations of I/O modules or remote terminal modules or number of retries is not normal. Initial program contains an error.
• 2 ..... Cable breakage or power supply of I/O modules or remote terminal modules is turned off.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
</table>

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table App.2.2 Special Register List (continued)

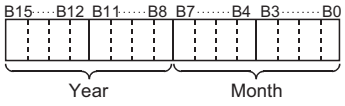
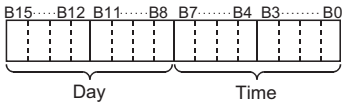
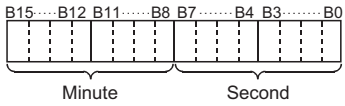
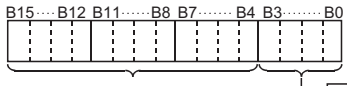
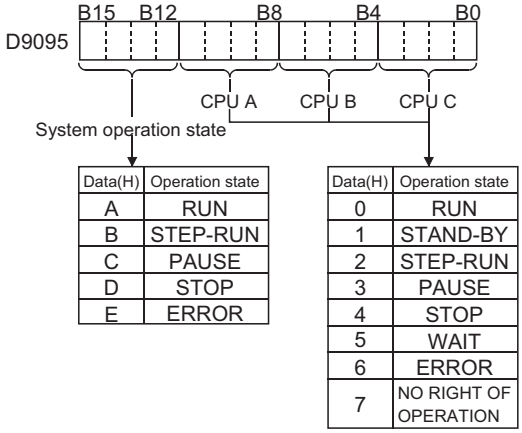
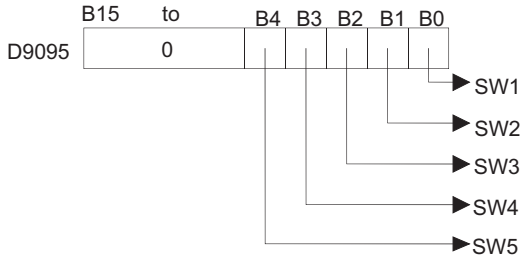
Number	Name	Description	Details	Applicable CPU	
D9068	Abnormal base module	Stores the bit pattern of the abnormal base module	Stores the bit pattern of the base module in abnormal condition. When basic base module is abnormal: Bit 0 turns on. When 1st expansion base module is abnormal: Bit 1 turns on. When 2nd expansion base module is abnormal: Bit 2 turns on. : : When 7th expansion base module is abnormal: Bit 7 turns on.	—	Dedicated to QCPU-A (A Mode)
D9072	PC communication check	Data check by AJ71C24	• In the loopback test mode of individual AJ71C24, the AJ71C24 automatically executes data write/read and communication check.	○	Usable with all types of CPUs.
D9073	Clock data	Clock data (year, month)	• Two digits showing the year (XX of 19XX) and month are stored to D9073 in BCD codes, as shown below.  Example: 1987,July H8707	—	Dedicated to A2CCPUC24 (-PRF)
D9074	Clock data	Clock data (day, time)	• Two digits showing the day and time are stored to D9074 in BCD codes, as shown below.  Example: 31th,10 o'clock H3110		
D9075	Clock data	Clock data (minute, second)	• Two digits showing the minute and second are stored to D9075 in BCD codes, as shown below.  Example: 35 minutes, 48 seconds H3548		Dedicated to A2CCPUC24 (-PRF)
D9075	Result of writing to built-in ROM	Stores the status of writing to the built-in ROM	Stores the status of writing to the built-in ROM. 0: Writing enabled F1H: During RAM operation F2H: Writing to built-in ROM disabled F3H: Failed to erase F4H: Failed to write FEH: Checking erasing FFH: During writing	—	Dedicated to QCPU-A (A Mode)
D9076	Clock data	Clock data (day of the week)	• Two day of the week is stored to D9076 in BCD codes, as shown below.  These digits are always set to 0. Day of the week: 0 Sunday; 1 Monday; 2 Tuesday; 3 Wednesday; 4 Thursday; 5 Friday; 6 Saturday	—	Dedicated to A2CCPUC24 (-PRF)
D9076	Status of writing to built-in ROM	Stores the status of writing (enabled/ disabled) to the built-in ROM	Stores the status of writing (enabled/disabled) to the built-in ROM. Statuses of DIP switch 3 and M9073 0: SW3 is off, M9073 is off/on 1: SW3 is on, M9073 is off 2: SW3 is on, M9073 is on	—	Dedicated to QCPU-A (A Mode)

Table App.2.2 Special Register List (continued)

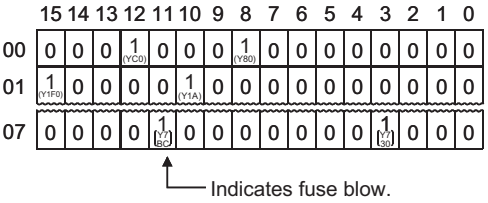
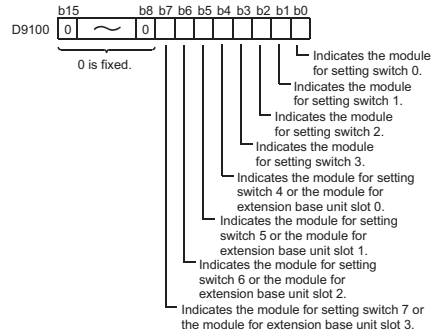
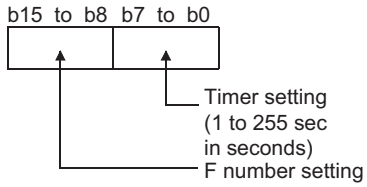
<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9077</td><td>Sequence accumulation time measurement</td><td>Accumulation time setting</td><td>• Stores the accumulation time used by M9077.
Setting range: 1 to 255ms (Default: 5ms)
* When the value other than 1 to 255 ms is designated, the value in D9077 is reset to 0.</td><td>—</td><td>Dedicated to QCPU-A (A Mode)</td></tr>
<tr><td>D9080</td><td>Number of executable CC-Link dedicated instructions</td><td>Stores the number of remaining CC-Link dedicated instructions being executable</td><td>Stores the number of remaining instructions (RIRD / RIWT / RISEND / RIRCV) being executable simultaneously at one scan.
(With QCUP-A or AnUCPU)
Number of remaining instructions being executable = 10 – Number of instructions executed simultaneously
(With AnSHCPU)
Number of remaining instructions being executable = 64 – Number of instructions executed simultaneously
*6: This function is available with the CPU of the following S/W versions or later.
<table><tr><th>CPU Type Name</th><th>Software Version</th></tr><tr><td>Q02CPU-A, Q02HCPU-A, Q06HCPU-A</td><td rowspan="2">Available with all versions</td></tr><tr><td>A1SJHCPU, A1SHCPU, A2SHCPU</td></tr><tr><td>A2UCPU (S1), A3UCPU, A4UCPU</td><td>S/W version Q (Manufactured in July, 1999)</td></tr><tr><td>A2USCPU (S1)</td><td>S/W version E (Manufactured in July, 1999)</td></tr><tr><td>A2USHCPU-S1</td><td>S/W version L (Manufactured in July, 1999)</td></tr></table></td><td>△</td><td>Can be used only with AnU, A2US, QCPU-A (A Mode) or AnSH *6</td></tr>
<tr><td>D9081</td><td>Number of vacant registration areas for communication requests</td><td>0 to 32</td><td>• Stores the number of vacant registration areas for communication requests executed to remote terminal modules connected to MINI (S3) link module, A2C and A52G.</td><td>—</td><td>Usable with AnA, A2AS, QCPU-A (A Mode), AnU, A2C and A52G.</td></tr>
<tr><td>D9082</td><td>Final connected station number</td><td>Final connected station number</td><td>• Stores the final station number of remote I/O modules and remote terminal modules connected to A2C and A52G.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
<tr><td>D9085</td><td>Time check time</td><td>1 s to 65535 s</td><td>• Sets the time check time of the data link instructions (ZNRD , ZNWR) for the MELSECNET/10.
• Setting range: 1 s to 65535 s (1 to 65535)
• Setting unit: 1 s
• Default value: 10 s (If 0 has been set, default 10 s is applied)</td><td>—</td><td>Usable with AnU and A2AS, QCPU-A (A Mode)</td></tr>
<tr><td>D9090</td><td>Microcomputer subroutine input data area head device number</td><td>Depends on the micro-computer program package to be used.</td><td>• For details, refer to the manual of each microcomputer program package.</td><td>△</td><td>Unusable with AnA, A2AS, QCPU-A (A Mode) and AnU.</td></tr>
<tr><td rowspan="2">D9091</td><td>Instruction error</td><td>Instruction error detail number</td><td>• Stores the detail code of cause of an instruction error.</td><td>—</td><td>Usable with AnA, A2AS, QCPU-A (A Mode),AnA board and AnU.</td></tr>
<tr><td>Microcomputer subroutine call error code</td><td>Depends on the micro-computer program package to be used.</td><td>• For details, refer to the manual of each microcomputer program package.</td><td>△</td><td>Unusable with AnA, A2AS, QCPU-A (A Mode),AnA board and AnU.</td></tr>
</table>

Table App.2.2 Special Register List (continued)

Number	Name	Description	Details	Applicable CPU	
D9091	SFC program detail error number	Detail error number of the error which occurred in a SFC program	• Stores the detail error number of the error occurred in a SFC program in a binary value.	—	Usable with AnN*, AnA*, AnU, A2US(H), A2C, AOJ2H, QCPU-A (A Mode), AnS, AnSH, A1FX.
*2 *3 D9094	Changed I/O module head address	Changed I/O module head address	• Stores upper 2 digits of the head I/O address of I/O modules to be loaded or unloaded during online mode in BIN code. Example) Input module X2F0 → H2F	—	Unusable with AnN, A3V, AnA, A73, AnU.
D9095	Operation state of the A3VTS system and A3VCPU	Stores operation with 4 hexadecimal digits.	• Monitors operation state of the A3VTS system and the A3VCPU.  Data(H) / Operation state: A RUN; B STEP-RUN; C PAUSE; D STOP; E ERROR Data(H) / Operation state: 0 RUN; 1 STAND-BY; 2 STEP-RUN; 3 PAUSE; 4 STOP; 5 WAIT; 6 ERROR; 7 NO RIGHT OF OPERATION	—	Dedicated to A3V.
	Dip switch information	Dip switch information	• Dip switch information of CPU module is stored as follows. 0:ON 1:OFF 	—	Usable with QCPU-A (A mode) only.
D9096	A3VCPU A Self-check error	Self-check error code	• Error code of self-check error on CPU A is stored in BIN code. • Cleared when D9008 of CPU A is cleared.	—	Dedicated to A3V.
D9097	A3VCPU B Self-check error	Self-check error code	• Error code of self-check error on CPU B is stored in BIN code. • Cleared when D9008 of CPU B is cleared.	—	Dedicated to A3V.
D9098	A3VCPU C Self-check error	Self-check error code	• Error code of self-check error on CPU C is stored in BIN code. • Cleared when D9008 of CPU C is cleared.	—	Dedicated to A3V.
D9099	A3VTU Self-check error	Self-check error code	• Error code of self-check error on A3VTU is stored in BIN code.	—	Dedicated to A3V.

:Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table App.2.2 Special Register List (continued)

Number	Name	Description	Details	Applicable CPU	
*1 D9100 *1 D9101 *1 D9102 *1 D9103 *1 D9104 *1 D9105 *1 D9106 *1 D9107	Fuse blown module	Bit pattern in units of 16 points of fuse blow modules	• Output module numbers (in units of 16 points), of which fuses have blown, are entered in bit pattern. (Preset output unit numbers when parameter setting has been performed.)  • Fuse blow check is executed also to the output module of remote I/O station. (If normal status is restored, clear is not performed. Therefore, it is required to perform clear by user program.) (For the AnU, A2US(H) and QCPU-A (A mode)) • Data clear of D9100 to D9107 is executed by turning off M9000 (fuse blown). (For the CPU other than the AnU, A2US(H) and QCPU-A (A mode)) • Data clear of D9100 to D9107 is executed by turning off D9100 to D9107 (fuse blown).	○	Usable with all types of CPUs Only remote I/O station information is valid for A2C.
*1 D9100	Fuse blow module	Fuse blow module bit pattern	• Stores the output module number of the fuses have blown in the bit pattern. 	—	Dedicated to A0J2H.
*2 D9108 *2 D9109 *2 D9110 *2 D9111 *2 D9112 *2 D9113 *2 D9114	Step transfer monitoring timer setting	Timer setting value and the F number at time out	• Sets value for the step transfer monitoring timer and the number of F which turns on when the monitoring timer timed out.  (By turning on any of M9108 to M9114, the monitoring timer starts. If the transfer condition following a step which corresponds to the timer is not established within set time, set annunciator (F) is tuned on.	—	Usable with AnN , AnA, AnU, A2AS, AnA board, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-ll Programming Manual.

Table App.2.2 Special Register List (continued)

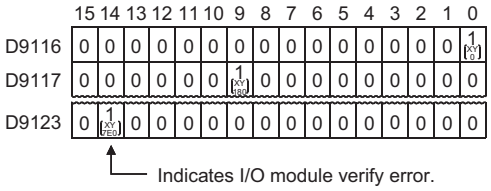
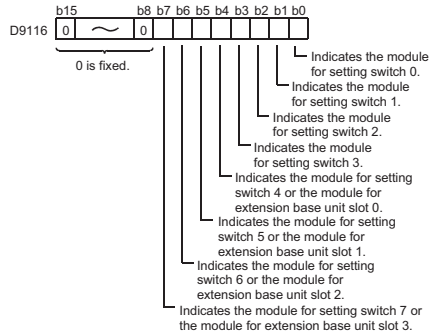
Number	Name	Description	Details	Applicable CPU	
*1 D9116 *1 D9117 *1 D9118 *1 D9119 *1 D9120 *1 D9121 *1 D9122 *1 D9123	I/O module verify error	Bit pattern in units of 16 points of verify error units	• When I/O modules, of which data are different from those entered at power-on, have been detected, the I/O unit numbers (in units of 16 points) are entered in bit pattern. (Preset I/O unit numbers when parameter setting has been performed.)  • I/O module verify check is executed also to remote I/O station modules. (If normal status is restored, clear is not performed. Therefore, it is required to perform clear by user program.)	○	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
*1 D9116	I/O module verification error	Bit pattern of verification error module	• When an I/O module different from the I/O module data registered during power-on is detected, this register indicates the bit pattern of the I/O module number. 	—	Dedicated to A0J2H.
D9124	Annunciator detection quantity	Annunciator detection quantity	• When one of F0 to 255 (F0 to 2047 for AnA and AnU) is turned on by SET F 1 is added to the contents of D9124. When RST F or LEDR instruction is executed, 1 is subtracted from the contents of D9124. (If the INDICATOR RESET switch is provided to the CPU, pressing the switch can execute the same processing.) • Quantity, which has been turned on by SET F is stored into D9124 in BIN code. The quantity turned on with SET F is stored up to "8."	○	Usable with all types of CPUs.

Table App.2.2 Special Register List (continued)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9125
D9126
D9127
D9128
D9129
D9130
D9131
D9132</td><td>Annunciator detection number</td><td>Annunciator detection number</td><td>• When one of F0 to 255 (F0 to 2047 for AnA and AnU) is turned on by SET F, F number, which has turned on, is entered into D9125 to D9132 in due order in BIN code.
F number, which has been turned off by RST F, is erased from D9125 to D9132, and the contents of data registers succeeding the data register, where the erased F number was stored, are shifted to the preceding data registers.
By executing LEDR instruction, the contents of D9125 to D9132 are shifted upward by one. (With a CPU equipped with an INDICATOR RESET switch, the same process occurs when the switch is pressed.
When there are 8 annunciator detections, the 9th one is not stored into D9125 to 9132 even if detected.
<table>
<tr><th></th><th>SET F50</th><th>SET F25</th><th>SET F99</th><th>RST F25</th><th>SET F15</th><th>SET F70</th><th>SET F65</th><th>SET F38</th><th>SET F110</th><th>SET F151</th><th>SET F210</th><th>LEDR</th><th></th></tr>
<tr><td>D9009</td><td>0</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>99</td></tr>
<tr><td>D9124</td><td>0</td><td>1</td><td>2</td><td>3</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>8</td><td>8</td></tr>
<tr><td>D9125</td><td>0</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>99</td></tr>
<tr><td>D9126</td><td>0</td><td>0</td><td>25</td><td>25</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>15</td></tr>
<tr><td>D9127</td><td>0</td><td>0</td><td>0</td><td>99</td><td>0</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>70</td></tr>
<tr><td>D9128</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>70</td><td>70</td><td>70</td><td>70</td><td>70</td><td>70</td><td>65</td></tr>
<tr><td>D9129</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>65</td><td>65</td><td>65</td><td>65</td><td>65</td><td>38</td></tr>
<tr><td>D9130</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>38</td><td>38</td><td>38</td><td>38</td><td>110</td></tr>
<tr><td>D9131</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>110</td><td>110</td><td>110</td><td>151</td></tr>
<tr><td>D9132</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>151</td><td>151</td><td>210</td></tr>
</table></td><td>○</td><td>Usable with all types of CPUs</td></tr>
<tr><td>D9133
D9134
D9135
D9136
D9137
D9138
D9139
D9140</td><td>Remote terminal card information</td><td>00: No I/O module or remote terminal module or initial communication impossible
01: Input module or remote terminal module
10: Output module</td><td>• Stores information of I/O modules and remote terminal modules connected to the A2C and A52G corresponding to station number.
• Information of I/O modules and remote terminal modules is for input, output and remote terminal module identification and expressed as 2-bit data.
00: No I/O module or remote terminal module or initial communication is impossible.
01: Input module or remote terminal module
10: Output module
• Data configuration
<table>
<tr><th></th><th>b15 b14</th><th>b13 b12</th><th>b11 b10</th><th>b9 b8</th><th>b7 b6</th><th>b5 b4</th><th>b3 b2</th><th>b1 b0</th></tr>
<tr><td>D9133</td><td>Station 8</td><td>Station 7</td><td>Station 6</td><td>Station 5</td><td>Station 4</td><td>Station 3</td><td>Station 2</td><td>Station 1</td></tr>
<tr><td></td><td>Station 16</td><td>Station 15</td><td>Station 14</td><td>Station 13</td><td>Station 12</td><td>Station 11</td><td>Station 10</td><td>Station 9</td></tr>
<tr><td></td><td>Station</td><td>Station</td><td>Station</td><td>Station</td><td>Station 20</td><td>Station 19</td><td>Station 18</td><td>Station</td></tr>
<tr><td></td><td>Station 56</td><td>Station 55</td><td>Station 54</td><td>Station 53</td><td>Station 52</td><td>Station 51</td><td>Station 50</td><td>Station 49</td></tr>
<tr><td>D9140</td><td>Station 64</td><td>Station 63</td><td>Station 62</td><td>Station 61</td><td>Station 60</td><td>Station 59</td><td>Station 58</td><td>Station 57</td></tr>
</table></td><td></td><td>Usable with A2C and A52G</td></tr>
</table>

Table App.2.2 Special Register List (continued)

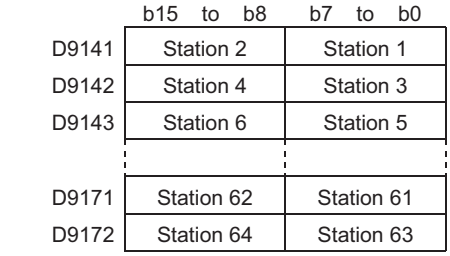
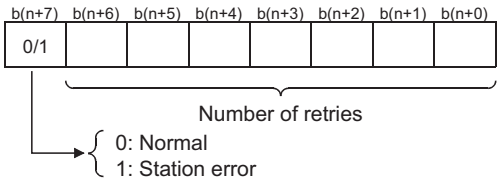
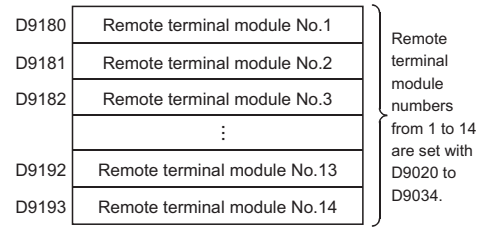
Number	Name	Description	Details	Applicable CPU	
D9141 D9142 D9143 D9144 D9145 D9146 D9147 D9148 D9149 D9150 D9151 D9152 D9153 D9154 D9155 D9156 D9157 D9158 D9159 D9160 D9161 D9162 D9163 D9164 D9165 D9166 D9167 D9168 D9169 D9170 D9171 D9172	Number of times of retry execution	Number of retries	• Stores the number of retries executed to I/O modules or remote terminal modules which caused communication error. (Retry processing is executed the number of times set at D9174.) • Data becomes 0 when communication is restored to normal. • Station number setting of I/O modules and remote terminal modules is as shown below.  • Retry counter uses 8 bits for one station.  * "n" is determined by station number of I/O module or remote terminal module. Odd number stations: b0 to b7 (n = 0) Even number stations: b8 to b15 (n = 8)	—	Usable with A2C and A52G.

Table App.2.2 Special Register List (continued)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th colspan="3">Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td rowspan="5">D9173</td><td rowspan="5">Mode setting</td><td rowspan="5">0: Automatic online return enabled
1: Automatic online return disabled
2: Transmission stop at online error
3: Line check</td><td colspan="3">Mode setting</td><td rowspan="5">—</td><td rowspan="5">Usable with A2C and A52G.</td></tr>
<tr><td>0</td><td>Auto-matic online return enabled</td><td>• When an I/O module or a remote terminal module caused communication error, the station is placed offline.
• Communication with normal stations is continued.
• The station recovering from a communication error automatically resumes communication.</td></tr>
<tr><td>1</td><td>Auto-matic online return disabled</td><td>• When an I/O module or a remote terminal module caused communication error, the station is placed offline.
• Communication with normal stations is continued.
• Though a faulty station returned to normal, communication is not restored unless the station module is restarted.</td></tr>
<tr><td>2</td><td>Trans-mission stop at online error</td><td>• When an I/O module or a remote terminal module caused communication error, communication with all stations is stopped.
• Though a faulty station returned to normal, communication is not restored unless the station module is restarted.</td></tr>
<tr><td>3</td><td>Line check</td><td>• Checks hardware and connecting cables of I/O modules and remote terminal modules.</td></tr>
<tr><td>D9174</td><td>Setting of the number of retries</td><td>Number of retries</td><td colspan="3">• Sets the number of retries executed to I/O modules and remote terminal modules which caused communication error.
• Set for 5 times at power on.
• Set range: 0 to 32
• If communication with an I/O module or a remote terminal module is not restored to normal after set number of retries, such module is regarded as a faulty station.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
<tr><td>D9175</td><td>Line error retry counter</td><td>Number of retries</td><td colspan="3">• Stores the number of retries executed at line error (time out).
• Data becomes 0 when line is restored to normal and communication with I/O modules and remote terminal modules is resumed.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
<tr><td>D9180
D9181
D9182
D9183
D9184
D9185
D9186
D9187
D9188
D9189
D9190
D9191
D9192
D9193</td><td>Remote terminal module error number</td><td>Remote terminal number</td><td colspan="3">• Stores error code of a faulty remote terminal module when M9060 is turned on.
• The error code storage areas for each remote terminal module are as shown below.
 

• Error code is cleared in the following cases.
• When the RUN key switch is moved from STOP to RUN.
(D9180 to D9183 are all cleared.)
• When Yn4 of each remote terminal is set from off to on.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
</table>

Table App.2.2 Special Register List (continued)

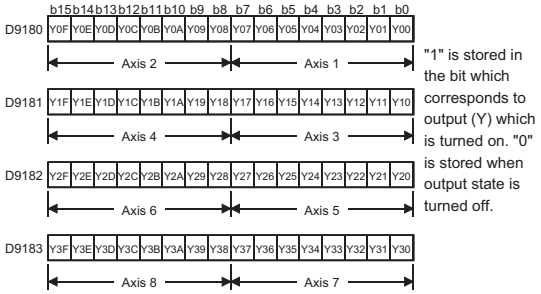
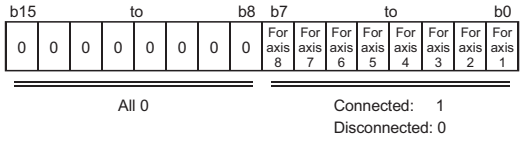
Number	Name	Description	Details		
D9180	Limit switch output state storage areas for axes 1 and 2	Bit pattern of limit switch function output state	• Stores output state of limit switch function.  "1" is stored in the bit which corresponds to output (Y) which is turned on. "0" is stored when output state is turned off.	—	Dedicated to A73.
D9181	Limit switch output state storage areas for axes 3 and 4			—	Dedicated to A73.
D9182	Limit switch output state storage areas for axes 5 and 6			—	Dedicated to A73.
D9183	Limit switch output state storage areas for axes 7 and 8			—	Dedicated to A73.
D9184	Cause of PCPU error	PCPU error code	• Stores error codes occurred at the PCPU in BIN code. 0 : Normal 1 : A73CPU hardware error 2 : PCPU error 10: A70AF error 11: A70AF error 12: A70MDF error 13: AY42 error	—	Dedicated to A73.
D9185	Servo amplifier connection data	Bit pattern of servo amplifier connection state	• Servo amplifier connection state is checked and the result is stored in the bit which corresponds to each axis number. Connection state is continuously checked. Axes which changed from disconnected state to connected state are regarded as connected. But, axes which changed from connected state to disconnected state are still regarded as connected. 	—	Dedicated to A73.

Table App.2.2 Special Register List (continued)

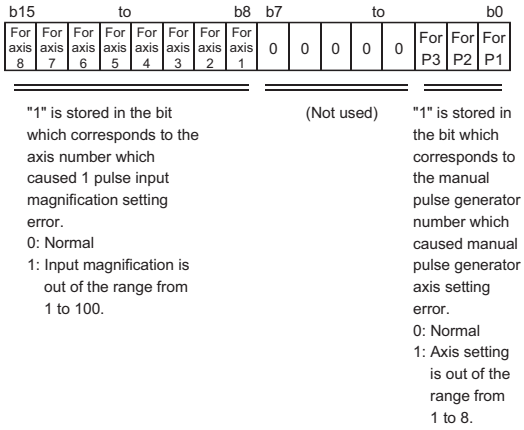
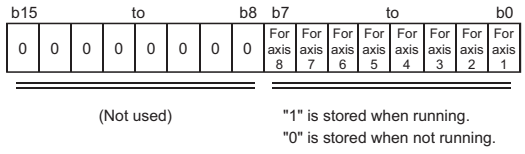
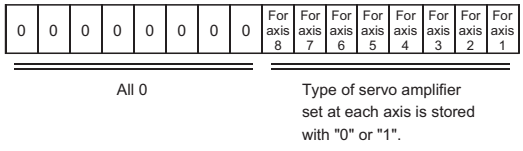
Number	Name	Description	Details		
D9187	Manual pulse generator axis setting error	Manual pulse generator axis setting error code	• Stores error code when the manual pulse generator axis setting error flag (M9077) is turned on in the bit each corresponds to each axis number. 	—	Dedicated to A73.
D9188	Starting axis number at test mode request error	Starting axis number	• Stores axis number in the bit which corresponds to the axis which was running when a test mode request was given and test mode request error occurred. 	—	Dedicated to A73.
D9189	Error program number	Error program number	• Stores error servo program number (0 to 4095) when the servo program setting error flag (M9079) is turned on.	—	Dedicated to A73.
D9190	Data setting error	Data setting error number	• Stores error code which corresponds to the error setting item when the servo program setting error flag (M9079) is turned on.	—	Dedicated to A73.
D9191	Servo amplifier type	Bit pattern of the axis connected to a general-purpose servo amplifier	• Stores type of connected servo amplifier in the bit which corresponds to each axis number. 0: MR-SB/MR-SD/MR-SB-K is connected or not connected. 1: General-purpose servo amplifier is connected. 	—	Dedicated to A73.

Table App.2.2 Special Register List (continued)

Number	Name	Description	Details		
D9196 D9197 D9198 D9199	Faulty station detection	Bit pattern of the faulty station	• Bit which corresponds to faulty I/O module or remote terminal module is set (1). (Bit which corresponds to a faulty station is set when normal communication cannot be restored after executing the number of retries set at D9174.) • If automatic online return is enabled, bit which corresponds to a faulty station is reset (0) when the station is restored to normal. • Data configuration 1: Error 0: Normal	—	Usable with A2C and A52G.

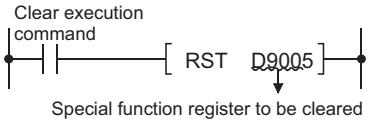
Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
D9196	Stasion 16	Stasion 15	Stasion 14	Stasion 13	Stasion 12	Stasion 11	Stasion 10	Stasion 9	Stasion 8	Stasion 7	Stasion 6	Stasion 5	Stasion 4	Stasion 3	Stasion 2	Stasion 1
D9197	Stasion 32	Stasion 31	Stasion 30	Stasion 29	Stasion 28	Stasion 27	Stasion 26	Stasion 25	Stasion 24	Stasion 23	Stasion 22	Stasion 21	Stasion 20	Stasion 19	Stasion 18	Stasion 17
D9198	Stasion 48	Stasion 47	Stasion 46	Stasion 45	Stasion 44	Stasion 43	Stasion 42	Stasion 41	Stasion 40	Stasion 39	Stasion 38	Stasion 37	Stasion 36	Stasion 35	Stasion 34	Stasion 33
D9199	Stasion 64	Stasion 63	Stasion 62	Stasion 61	Stasion 60	Stasion 59	Stasion 58	Stasion 57	Stasion 56	Stasion 55	Stasion 54	Stasion 53	Stasion 52	Stasion 51	Stasion 50	Stasion 49

POINTS

(1) The contents of special registers are all cleared when power supply is turned off regardless of latch clear operation or reset operation using the reset key switch. The contents are retained when the RUN/STOP key switch is set to STOP position.

(2) The contents of special registers marked *1 are not cleared even if normal status is recovered. Use any of the following methods to clear the data.

(a) Method by user program
Insert the circuit shown at right into the program, and turn on the clear execution command contact to clear the contents of registers.



(b) Method by peripheral device
Set the register to "0" by changing the present value with the test function of peripheral device or set to "0" by forced reset. For the operation method, refer to the Instruction Manual for each peripheral device.

(c) By moving the RESET key switch at the CPU module front to the RESET position, the special register is set to "0".

(3) Data is written to the special registers marked *2 in the sequence program.

(4) Data is written to the special registers marked *3 in test mode of the peripheral device.

Appendix3 Peripheral Device

(1) The following table shows the peripheral devices used in the existing systems and applicability of the system FD.

Model Name of a Peripheral Device	Model Name of a Software Package	Applicability	Applicable Range	Programmable controller Model Name at Start-up
A6GPP/A6PHP	SW4GP-GPPA	Usable	Device range of the A3ACPU	A3A
	SW3GP-GPPA	Usable	Device range of the A3HCPU	A3H
	The SW2□□ type or earlier	Not usable	–	–
A6HGP	SW3-HGPA	Usable	Device range of the A3HCPU	A3H
	The SW2□□ type or earlier	Not usable	–	–
A8PUE	–	Usable	Device range of the A3ACPU	A2USH (displayed at start-up)
A7PU A7PUS	–	Usable	Device range of the A3HCPU	A2USH (displayed at start-up)
A6WU	Software version "E"or later	Usable	Device range of the A3ACPU	–
	Software version "D"or earlier	Not usable	–	–

(2) The compatibility of the conventional products (The existing system products) and the new products (The AnU-compatible products) are listed in the following table.

No.	Product Used to Write to the CPU Module	Product Used to Read from the CPU module	Compatibility
1	The conventional product (Programmable controller: A3A start-up)	New product (Programmable controller: A3A start-up)	• All the data are compatible.
2	New product (Programmable controller: A3A start-up)	The conventional product (Programmable controller: A3A start-up)	
3	The conventional product (Programmable controller: A3A start-up)	New product (Programmable controller: A3U start-up)	• Because the programmable controller model names are different between when writing and when reading, the following conditions are identified. 1) If the verification is performed after reading, it turned out to be a mismatch. (The data can be used.) 2) The setting values of the sampling trace/status latch (data stroted in the CPU module) can not be displayed. 3) When the network parameters are set to the new product, they can not be displayed on the conventional product.
4	New product (Programmable controller: A3U start-up)	The conventional product (Programmable controller: A3A start-up)	

POINT

Do not read the QCPU-A, to which the MELSECNET/10 network parameters were set using a new product, from the conventional product and do not perform the following operation since the "LINK PARA. ERROR" (CPU module error) is detected.
(a) Modifying and writing the main sequence program area (Memory capacity).
(b) Writing the read parameters to another QCPU-A in the network system.

Appendix4 Precautions for Utilizing the Existing Sequence Programs for the QCPU-A

This section explains the precautions for utilizing the sequence programs created for the A1SHCPU, A2SHCPU to the QCPU-A.
The sequence programs created for the A2USCPU(S1) can directly be used for the QCPU-A.

POINT

(1) The following three instructions dedicated to the AnUCPU can be used by adding to the existing sequence program.
- ZNWR instruction
  .....For writing word devices of MELSECNET/10 connection station
- ZNRD instruction
  .....For reading word devices of MELSECNET/10 connection station
- ZCOM instruction
  .....For MELSECNET/10 network refresh instruction

(2) All of the sequence programs for the A1SHCPU and A2SHCPU can be used.

(3) The following instructions cannot be used by the QCPU-A as they cannot be used by the A2USCPU(S1), A2USHCPU-S1. However, note that the processing is different between the A2USCPU(S1) and QCPU-A when they are mistakenly operated.

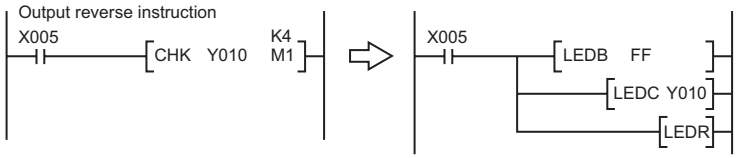
Item	Q06HCPU-A	Q02(H)CPU-A	A2USHCPU-S1	A2USCPU(S1)
LED, LEDC instruction	No error occurs.			"INSTRCT CODE ERR." (error code 101) occurs.
CHG instruction	Can be used.	"CAN'T EXECUTE(P)" (error code 134) occurs.		

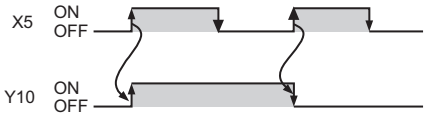
(4) When frequently performing the FROM/TO instruction for the special function module in short scan time, it may cause an operation error in the target special function module.
When executing the FROM/TO instruction, match the processing time and conversion time for the special function module using timer or constant scan function.

Appendix4.1 Instructions with different specifications

This section explains how to modify the sequence program when the instructions with different specifications are used.
Basically, the instructions which are not listed in this section do not require modifications.

(1) CHK instruction..... Modifications are required when the A1SHCPU or the A2SHCPU is used in the refresh mode.

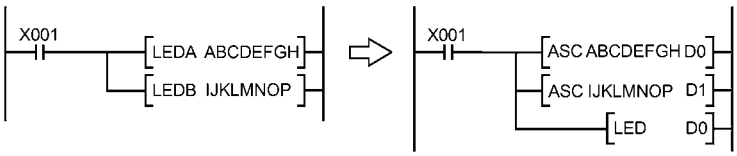




(2) DI/EI instruction.....Modifications are required when the special relay M9053 is on.

- When M9053 is turned on, the Enable/Disable setting of the link refresh instruction (EI, DI) can be performed.
- As the QCPU-A performs the link refresh in the END processing, enabling/ disabling the link refresh during the sequence program execution is not allowed. Therefore, modify the sequence program.

(3) LEDA/LEDB instruction



(4) SUB, SUBP instruction..... Unusable

- As the QCPU-A cannot store the microcomputer program, the SUB instruction is cannot be used.
- To use in the QCPU-A, all the data processed in the microcomputer program area has to be changed into those of the dedicated instructions.

Appendix4.2 Special relays and special registers with different specifications

The QCPU-A do not use the following special relays and special registers.
Although no error occurs even if the following special relays and special registers in the original program remain in the newly created program (they will be ignored), it is recommended to delete them from the program.

- M9010 ..... Turns on when an operation error occurs, and off when the error is removed.
- M9053 ..... Turns on when executing the EI instruction with the link refresh enable instruction or the interrupt enable instruction and the DI instruction with the link refresh disable instruction or the interrupt disable instruction.

Appendix4.3 Parameter setting

The parameters set in the existing CPU module can be utilized without any modifications if none of them meets the following conditions.

Setting Item	Description
Microcomputer program capacity	The microcomputer program area of the QCPU-A is dedicated for the SFC. "PARAMETER ERROR" occurs if a utility package for the microcomputer program is stored in the microcomputer program area of the existing CPU module.
Registering the module name by I/O assignment (By the system FD compatible with the QCPU-A).	When the AD57 module or AD57-S1 module is used in the existing system, the utility package of the SW□-AD57P is stored in the microcomputer program area. The QCPU-A system does not allow the AD57 or AD57-S1 to be loaded.

The processing of the following items is different from the parameter setting of the existing CPU module.

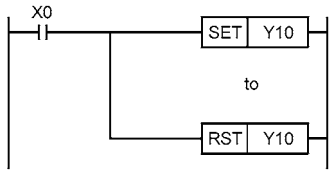
- Watchdog timer setting .....The set time is ignored, and 200ms is applied.
- Interrupt counter setting ..... The interrupt counter set by the A1SHCPU and A2SHCPU are ignored and processed as a normal counter by the sequence program.

Appendix4.4 I/O control mode

The I/O control mode of the QCPU-A is the refresh mode (partial direct I/O depending on the instruction), and is different from that of the A1SHCPU and A2SHCPU. Therefore pay attention to the input timing of the input (X) and the output timing of the output (Y).

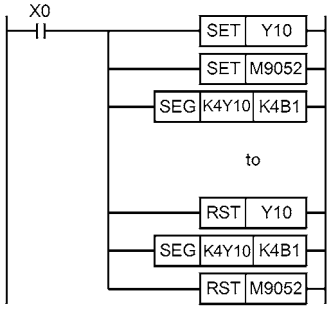
(1) Pulse processing program by the SET/RST instruction
To make the QCPU-A execute the pulse output used in the direct mode by the SET/RST instruction in the A1SHCPU or A2SHCPU, create the program as follows:

For direct mode of the A1SHCPU and A2SHCPU

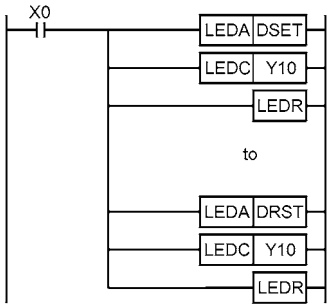


(a) When the ACPU common instructions are used:

For the QCPU-A



(b) When the dedicated instructions for the QCPU-A are used:



POINT
When a special function module such as the A1SD61-S1 high-speed counter module is used, use the above program if outputting the pulse signals to the module is required.

Appendix4.5 Microcomputer program

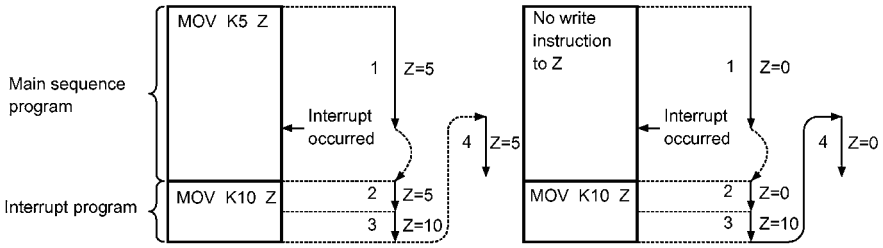
Since the QCPU-A do not have the microcomputer mode, the utility software packages and user-created microcomputer programs used for the A1SHCPU and A2SHCPU are not available. The microcomputer program area of the QCPU-A is dedicated for the SFC. When the utility software packages or the microcomputer programs above are used, delete all of the SUB instructions (microcomputer program call) used for executing them from the sequence program.
When the following utility packages are used, modify the program using the QCPU-A dedicated instructions.

1) SW□-UTLP-FNO..... Type AnSHCPU/AnACPU/AnUCPU/QCPU-A (A mode) Programming Manual (Dedicated Instructions) IB-66251
2) SW□-UTLP-PID..... Type AnACPU/AnUCPU/QCPU-A (A Mode) Programming Manual (PID Control Instructions) IB-66258
3) SW□-SIMA
4) SW□-UTLP-FDI
5) SW□-SAPA

} Unusable

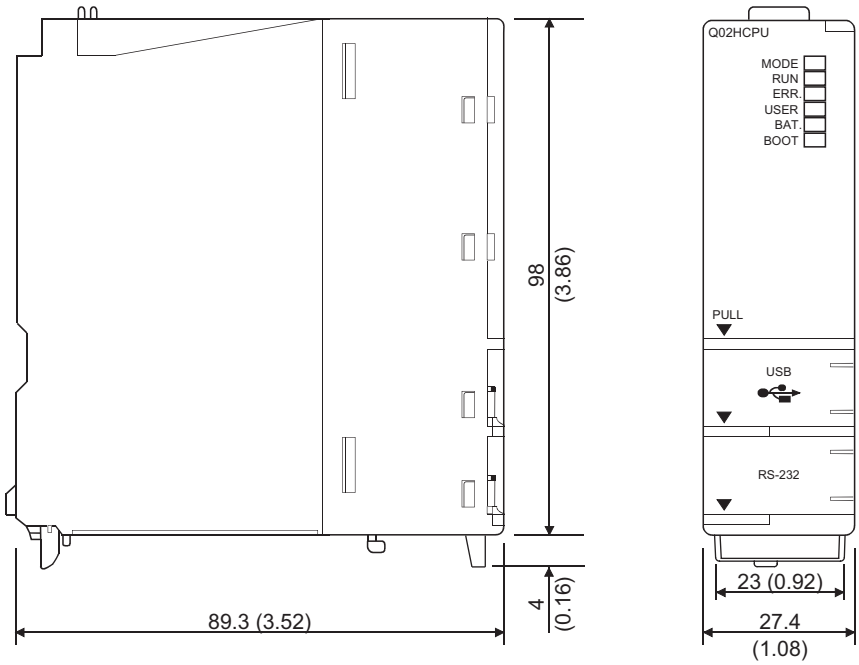
Appendix4.6 Index register processing

The index register of the QCPU-A is rewritten to the value prior to the execution of the interrupt program when the processing is transferred to the main or sequence program even if the value was updated by the interrupt program.



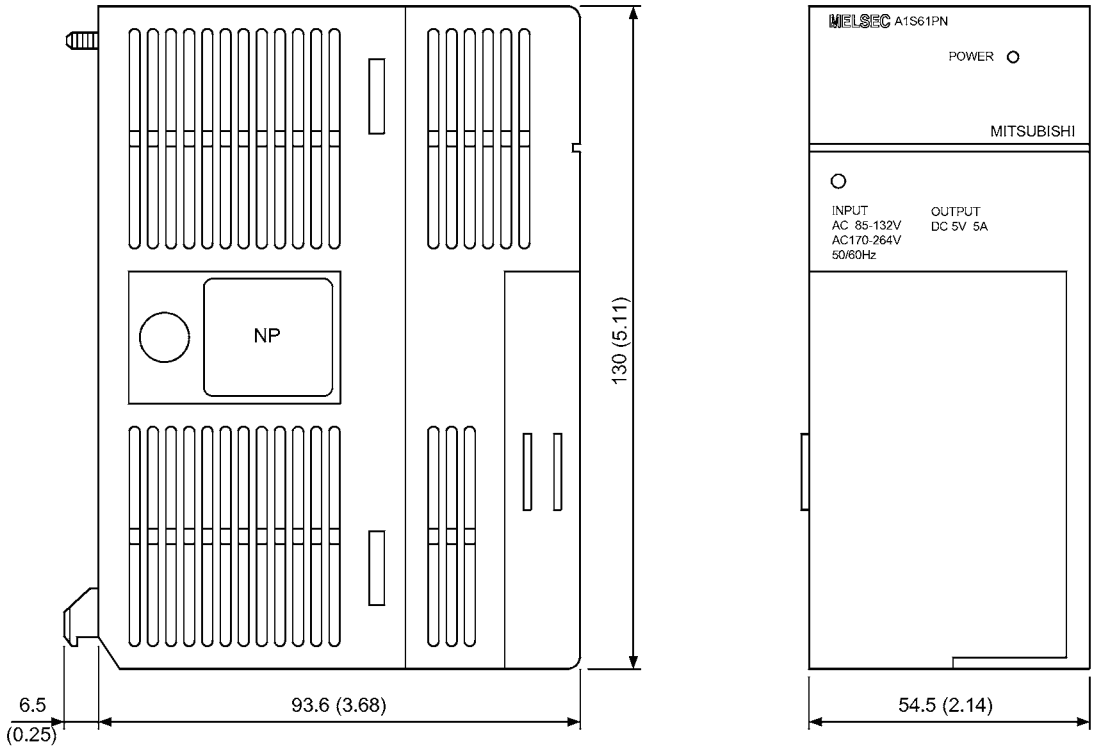
Appendix5 External Dimensions

Appendix5.1 Q02CPU-A, Q02HCPU-A and Q06HCPU-A QCPU-A module



Unit : mm (inch)

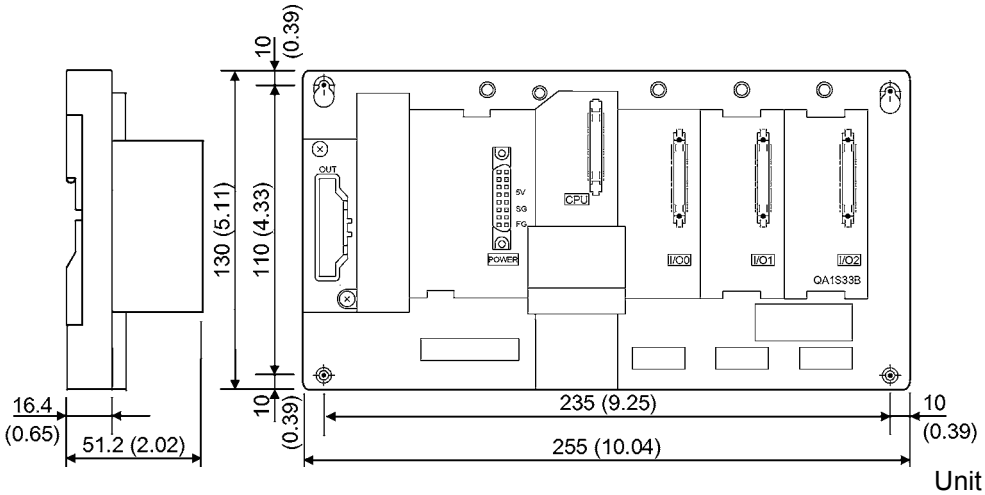
Appendix5.2 A1S61PN, A1S62PN and A1S63P power supply modules



Unit : mm (inch)

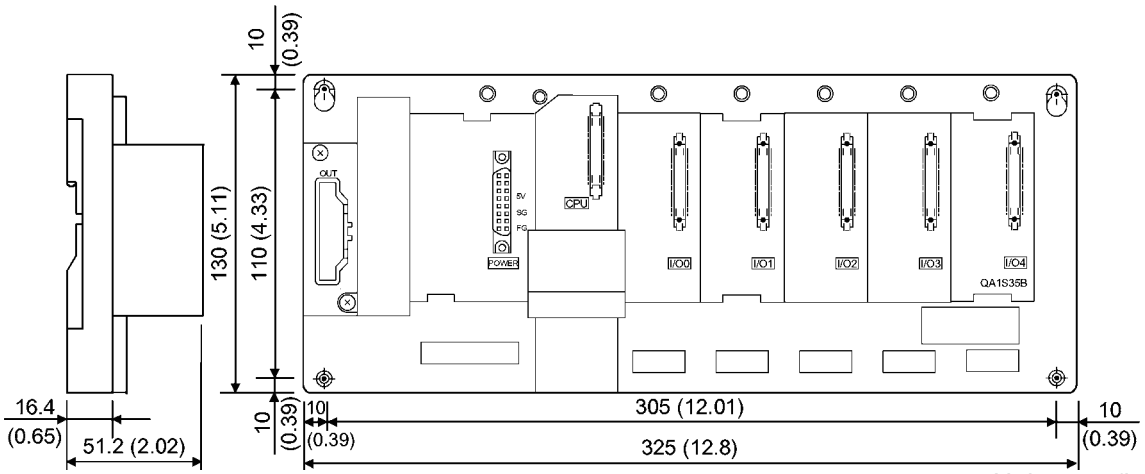
Appendix5.3 Base unit

(1) Main base unit (QA1S33B)



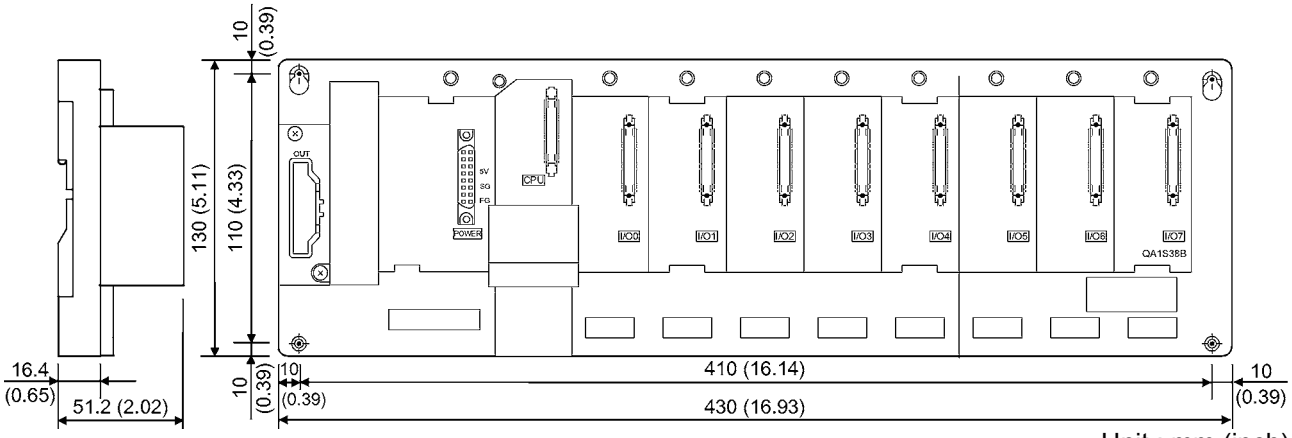
Unit : mm (inch)

(2) Main base unit (QA1S35B)



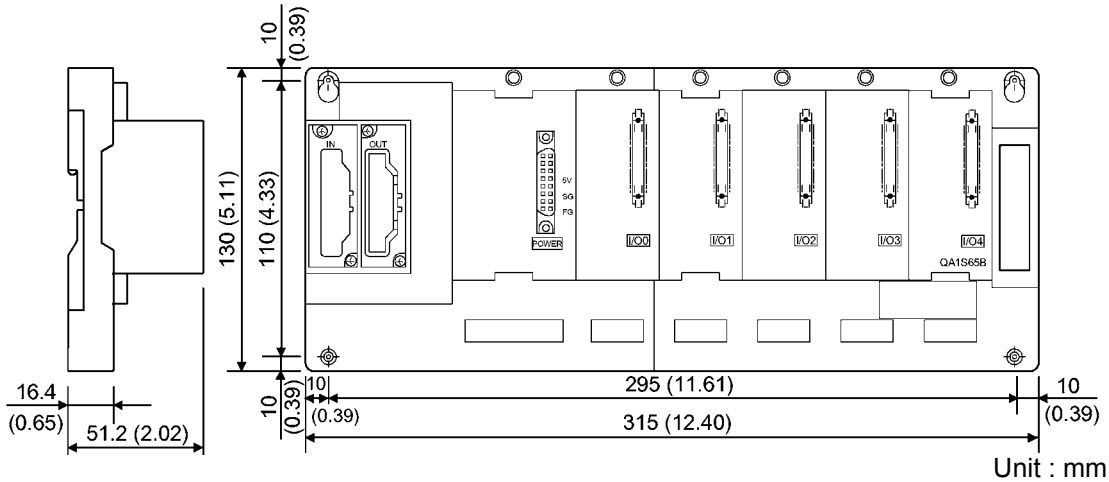
Unit : mm (inch)

(3) Main base unit (QA1S38B)



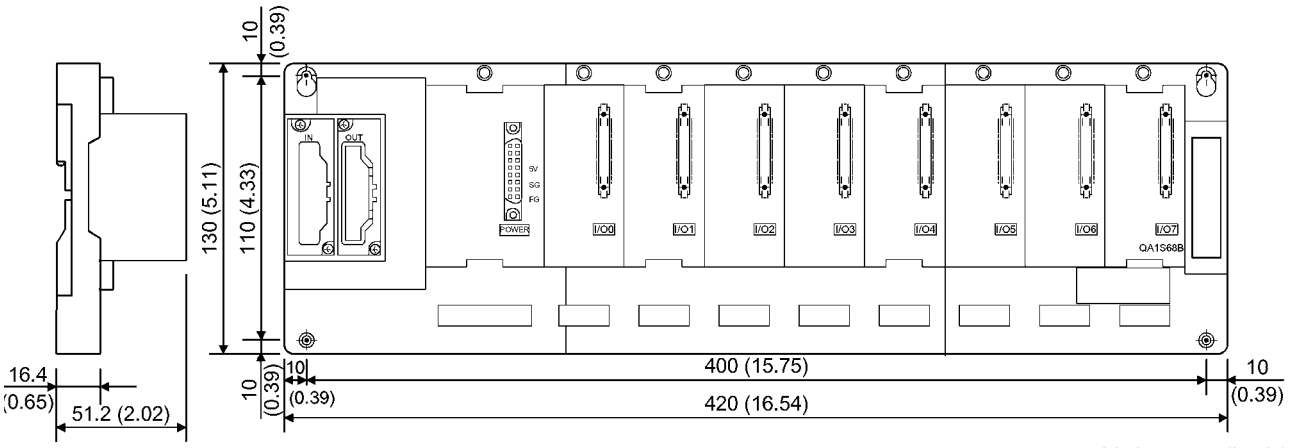
Unit : mm (inch)

(4) Extension base unit (QA1S65B)



Unit : mm (inch)

(5) Extension base unit (QA1S68B)



Unit : mm (inch)

Appendix6 Transportation Precautions

When transporting lithium batteries, make sure to handle them based on the transportation regulations.

Appendix6.1 Relevant models

The batteries used for CPU modules are classified as follows:

Product Name	Model Name	Description	Handling Category
Battery	Q6BAT	Lithium battery	Non-dangerous goods
SRAM card battery	Q2MEM-BAT	Lithium coin battery	
Memory card	Q2MEM-1MBS	Packed with lithium coin battery(Q2MEM-BAT)	

Appendix6.2 Transportation Guidelines

Products are packed properly in compliance with the transportation regulations prior to shipment. When repacking any of the unpacked products to transport it to another location, make sure to observe the IATA Dangerous Goods Regulations, IMDG Code and other local transportation regulations.

For details, please consult your transportation company.

Appendix7 Handling of Batteries and Devices with Built-in Batteries in EU Member States

This section describes the precautions for disposing of waste batteries in EU member states and exporting batteries and/or devices with built-in batteries to EU member states.

Appendix7.1 Disposal precautions

In EU member states, there is a separate collection system for waste batteries. Dispose of batteries properly at the local community waste collection/recycling center.

The following symbol is printed on the batteries and packaging of batteries and devices with built-in batteries used for Mitsubishi programmable controllers.

Note: This symbol is for EU member states only.
The symbol is specified in the new EU Battery Directive (2006/66/EC) Article 20 "Information for end-users" and Annex II.

The symbol indicates that batteries need to be disposed of separately from other wastes.

Appendix7.2 Exportation precautions

The new EU Battery Directive (2006/66/EC) requires the following when marketing or exporting batteries and/or devices with built-in batteries to EU member states.

- To print the symbol on batteries, devices, or their packaging
- To explain the symbol in the manuals of the products

(1) Labelling

To market or export batteries and/or devices with built-in batteries, which have no symbol, to EU member states on September 26, 2008 or later, print the symbol shown on the previous page on the batteries, devices, or their packaging.

(2) Explaining the symbol in the manuals

To export devices incorporating Mitsubishi programmable controller to EU member states on September 26, 2008 or later, provide the latest manuals that include the explanation of the symbol.

If no Mitsubishi manuals or any old manuals without the explanation of the symbol are provided, separately attach an explanatory note regarding the symbol to each manual of the devices.

POINT
The requirements apply to batteries and/or devices with built-in batteries manufactured before the enforcement date of the new EU Battery Directive (2006/66/EC).

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WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.
[Gratis Warranty Term]
The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.
[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
   1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
   2. Failure caused by unapproved modifications, etc., to the product by the user.
   3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
   4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
   5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
   6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
   7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued.
Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not , compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

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Pentium is a trademark of Intel Corporation in the United States and other countries.
Ethernet is a trademark of Xerox Corporation.
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SH (NA) 080065-G

QCPU-A (A Mode)

User's Manual

MODEL	QCPU-A(A)-U-SHO-E
MODEL CODE	13JR10
SH(NA)-080065-G(1003)MEE	

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN

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Specifications subject to change without notice.